April 1983 $2.49½
Issue #271

73

Amateur Radio's Technical Journal

International Edition

A Wayne Green Publication

8 Great Builder's Projects!

E.T.'s Ham Friend
Page 52

On-the-Air Mailboxes
Page 44

73 Goes International!
Page 70

Powerful Field-Day Shaper-Upper
Page 12

Stop That Dish!
Page 84

TRS-80 Bennies for Hams
Page 32

Pedal Power: A Perfect Field-Day Generator
This bicycle-driven power source is easy to build and guaranteed to get you in shape. No heavy breathing into the mike, please. KN6H 12

No-Crash Autopatch
Dialing and driving don't mix. Build this autodialer and let its fingers do the walking—not yours. W3ZC 20

Turn Mobile-Rig Whine into a Whimper
From brute-force filtering to solid-state regulation, K4AJQ has the answers to mobile noise. K4AJQ 30

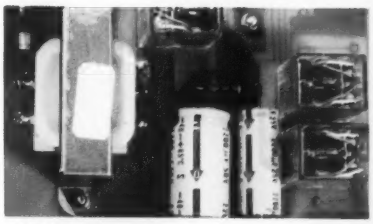
Exploit the Hidden Interfaces of the TRS-80
Sound synthesis, a programmable timed on-off switch, and a CW keyer are all hidden in the TRS-80. You just have to look in the right place. WB9EGA 32

New England's Nicad Per-Charger
Build this and get state-of-charge readout, automatic shutdown, and charge maintenance for your HT. This could be the gift of life for your battery pack. K1QPS, WA1UNU 38

Immortalize Your IC-2AT Battery Pack
Why waste your nicads when you're in the car? Build this miniature power supply and your batteries will last forever. KP4AQI 40

Unlock the New Electronic Mailboxes
MSOs are at the forefront of amateur radio's vast communications revolution. WB7QWG shows you how to tune in, log on, and not drop out. WB7QWG/9 44

E.T.—52



Dish Stopper—84

How E.T. Really Called Home
If it were not for an inventive ham, E.T. might still be trying. In this exclusive article, the designer of the little guy's communicator unveils its inner workings. K2SSQ 52

Buyer's Guide to Dayton
From securing accommodations to planning your expenses, WA4BPI helps you make the most of your Hamvention buck. WA4BPI 56

The Best Way to Mount Your Mobile Rig
If you have a van and HF gear, this is what you need to put them together—including a movable mount. KE7X 64

The Florida T-R Switch
Get your 2m amplifier out of the way—without a relay. W4HJW 83

Build the Deadeye Dish Controller
Tired of taking potshots at satellites? With the flick of a switch, this easy-to-build rotator will hit the bull's-eye every time. W5JG 84

The Ultimate Protection Plan for Your HT
Bangs, bumps, scrapes, and crashes make life tough for HTs. Make these modifications to protect your investment. K2YKE 92

Never Say Die—6
73 International—70
Social Events—94
Satellites—97
Letters—97
Fun!—99
Ham Help—100, 108
Review—102
RTTY Loop—104
Circuits—106
Corrections—108
Reader Service—114
New Products—116
Contests—118
Awards—120
DX—122
Dealer Directory—146
Propagation—146

0 74470 65946 04

IC-740

Extensive Versatility for the Serious Operator

The ICOM IC-740 offers features found only on the best amateur equipment and performance second to none.

Dynamic Range. The IC-740 is built to withstand strong adjacent signals and still maintain sensitivity and distortion-free output of the desired signal in its passband. With a dynamic range of over **100 dBm** and an intercept point of **+18dBm,** the IC-740 receiver is a true performer. The IC-740 receiver is also **crunch proof,** and unlike many receivers that have good receiver specifications, it does not collapse under the presence of an RF field.

Other outstanding features that are a must for a modern, high-performance amateur receiver are included in the IC-740:

Passband Tuning, adding an additional filtering element to the receiver passband plus giving control of the actual width of the IF stages of the receiver... variable from 2.4 kHz to 700 kHz in SSB, CW or RTTY.

Variable AGC, a two speed AGC with an OFF position allows proper selection of AGC speed **regardless** of mode, VOX or CW breakin. The OFF position makes the IC-740 easily adaptable to frequency converters.

A **Noise Blanker** that really works with both wide and narrow pulse widths and a threshold control to give the optimum blanking with minimum of signal distortion.

And...the IC-740 has an optional **Internal Power Supply** giving 160-10 meter transceive coverage in **one** package.

EX238 AC POWER SUPPLY

These and other fine receiver features plus ICOM's renowned transmitter audio make the IC-740 the **finest amateur transceiver** around today.

$50 Cash Rebate

$50.00 for the purchase of an IC-740.

Begins Dec. 15, 1982
Expires April 30, 1983

OFFER EXTENDED!

ICOM

The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

KLM/Tri-EX SALE!

KT-34A
REGULAR $389.95
SALE $299

KT-34XA
REGULAR $569.95
SALE $459

TRI-EX W-51, 51' TOWER
REGULAR $999.95
SALE $799

NEW! 30M BEAM
CALL FOR PRICE/INFO.

PRICES ARE FOB CALIF. EXCEPT FOR CERTAIN COMBINATIONS. PLEASE INQUIRE.

YAESU

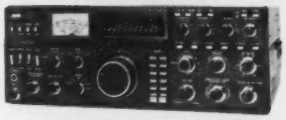
FT-208R
2 METER FM.

FT-708R
70CM, FM.

CALL FOR SALE PRICES

KENWOOD

TS-930S



W/ANTENNA TUNER

PLUS FREE BONUS. SP-930 SPKR. / MC-60A MIC / YK-88C-1 FILTER

$1799 SAVE $230

TS-430S

CALL FOR PRICES

5-STORE BUYING POWER *in action!*

IF ITS FOR HAM RADIO WE SHOULD HAVE IT IN STOCK AT LOW PRICES.

MIRAGE

2 METER AMPLIFIERS

B-3016 30W IN, 160W OUT
REG. $239.95 ***$199.95***

B-1016 10W IN, 160W OUT
REG. $279.95 ***$249.95***

B-108 10W IN, 80W OUT.
REG. $179.95 ***$159.95***

B-23 2W IN, 30W OUT.
REG. $89.95 ***$79.95***

ETO ALPHA

SPECIAL PRICES ON ALL ALPHA EQUIPMENT.

ICOM

NEW! AVAILABLE!

IC-R70

GENERAL COVERAGE RECEIVER

REGULAR $749

SALE $649

FREE SHIPMENT *(U.P.S. Brown)* CONTINENTAL U.S.A.

EXCEPT FOR SOME ALPHA, TRI EX and KLM ITEMS.

SERVING HAMS BETTER.
North...south...east...west.

Bob Ferrero, W6RJ
Jim Rafferty, N6RJ
other well known hams give you courteous, personalized service.

FREE PHONE 800 854-6046

9:30AM to 5:30PM PACIFIC TIME.

OVER-THE-COUNTER, 10AM to 5:30PM.
MONDAY THROUGH SATURDAY

CALIFORNIA CUSTOMERS PLEASE PHONE OR VISIT LISTED STORES.

HAM RADIO OUTLET™

ANAHEIM, CA 92801
2620 W. La Palma,
(714) 761-3033 (213) 860-2040
Between Disneyland & Knott's Berry Farm

BURLINGAME. CA 94010
999 Howard Ave., (415) 342-5757
5 miles south on 101 from S.F. Airport.

OAKLAND, CA 94609
2811 Telegraph Ave., (415) 451-5757
Hwy 24 Downtown. Left 27th off-ramp.

SAN DIEGO, CA 92123
5375 Kearny Villa Road (619) 560-4900
Hwy 163 & Clairemont Mesa Blvd.

VAN NUYS, CA 91401
6265 Sepulveda Blvd., (213) 988-2212
San Diego Fwy at Victory Blvd.

AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ARRL • ASTRON
AVANTI • BELDON • BENCHER • BERK-TEC • BIRD • B & W
BUTTERNUT • CALLBOOK • CDE • COLLINS • CURTIS • CUSHCRAFT
DAIWA • DRAKE • DX EDGE • DX ENGINEERING • EIMAC
HUSTLER • HY-GAIN • ICOM • J. W. MILLER • KENWOOD • KLM
LARSEN • LUNAR • METZ • MFJ • MICRO-LOG • MINI-PRODUCTS
MIRAGE • NYE • PALOMAR • ROBOT • ROHN • SHURE • TELEX
TEMPO • TEN-TEC • TRISTAO • VOCOM • YAESU and many more!

Prices, specifications, descriptions subject to change without notice. Calif. residents please add sales tax.

FLEXI-BILITY

AEA once again breaks new ground in the code communications field with the new model MBA-RC reader/code converter. The MBA-RC decodes Morse, Baudot or ASCII signals off the air and displays them on a large 32 character alphanumeric vacuum fluorscent display. In addition, it will output Morse code for keying your transmitter. It will also generate RTTY (Baudot or ASCII AFSK two tone output. (170 or 850 Hz shifts.) Any of the acceptable input codes can be converted to any of the specified output codes (any speed to any speed). If you have any of the common Baudot RTTY terminals as an example, you can now send and receive Morse and ASCII with your keyboard and printer. You can even generate ASCII or BAUDOT RTTY using your Morse hand key or memory keyer.

Prices and Specifications subject to change without notice or obligation. Software ©copyright by AEA.

BRITT'S TWO-WAY RADIO
2508 N. Atlanta Rd.
Smyrna, GA 30080
(404) 432-8006
1-800-241-2027 ✓223

AEA Brings you the Breakthrough!

At last! The answer to operating freedom! The Palomar Engineers SWR & Power Meter

- **Automatically computes SWR.**
- **Easy to read light bar display.**
- **Expanded SWR scale.**
- **Power ranges 20/200/2000 watts.**
- **Frequency range 1-30 MHz.**

Automatic. No "set" or "sensitivity" control. Computer sets full scale so SWR reading is always right. Complete hands-off operation.

Light bar display. Gives instant response so you can see SSB power peaks. Much faster than old-fashioned meters.

Easy to read. No more squinting at old-fashioned cross pointer meters. You can read the bright red SWR and power light bars clear across the room!

Model M-827 Automatic SWR & Power Meter only $119.95 in the U.S. and Canada. Add $3 shipping/handling. California residents add sales tax.

MasterCard VISA

ORDER YOURS NOW!

Send for FREE catalog describing the SWR & Power Meter and our complete line of Noise Bridges, Preamplifiers, Toroids, Baluns, Tuners, VLF Converters, Loop Antennas and Keyers.

Palomar Engineers
1924-F West Mission Rd.
Escondido, CA 92025
Phone: (619) 747-3343

INFO

Manuscripts

Contributions in the form of manuscripts with drawings and/or photographs are welcome and will be considered for possible publication. We can assume no responsibility for loss or damage to any material. Please enclose a stamped, self-addressed envelope with each submission. Payment for the use of any unsolicited material will be made upon acceptance. All contributions should be directed to the *73* editorial offices. "How to Write for *73*" guidelines are available upon request.

Editorial Offices:

Pine Street
Peterborough NH 03458
Phone: 603-924-9471

Advertising Offices:

Elm Street
Peterborough NH 03458
Phone: 603-924-7138

Circulation Offices:

Elm Street
Peterborough NH 03458
Phone: 603-924-9471

Subscription Rates

In the United States and Possessions:
One Year (12 issues) $25.00
Two Years (24 issues) $38.00
Three Years (36 issues) $53.00

Elsewhere:

Canada and Mexico—$27.97/1 year only, U.S. funds. Foreign surface mail—$44.97/1 year only, U.S. funds drawn on U.S. bank. Foreign air mail—please inquire.

To subscribe, renew or change an address:

Write to *73*, Subscription Department, PO Box 931, Farmingdale NY 11737. For renewals and changes of address, include the address label from your most recent issue of *73*. For gift subscriptions, include your name and address as well as those of gift recipients.

Subscription problem or question:

Write to *73*, Subscription Department, PO Box 931, Farmingdale NY 11737. Please include an address label.

73: Amateur Radio's Technical Journal (ISSN 0745-080X) is published monthly by Wayne Green, Inc., 80 Pine Street, Peterborough NH 03458. Second class postage paid at Peterborough NH 03458 and at additional mailing offices. Entire contents copyright© 1983, Wayne Green, Inc. All rights reserved. No part of this publication may be reprinted or otherwise reproduced without written permission from the publisher. Microfilm Edition—University Microfilm, Ann Arbor MI 48106. Postmaster: Send address changes to *73*, Subscription Services, PO Box 931, Farmingdale NY 11737.

TRADE IN or CASH DISCOUNT

Call Toll-Free

1-800-325-3636

for the

BEST DEAL

We trade on NEW or USED
Call for prices on available USED equipment

HAM RADIO CENTER

8340-42 Olive Blvd. ● P.O. Box 28271 ● St. Louis, MO 63132

VISA

IN MISSOURI CALL
1-314-993-6060

MasterCard

W2NSD/1
NEVER SAY DIE
editorial by Wayne Green

MY WISH BOOK

Just in case the equipment manufacturers are having any problem in figuring out what developments are needed for future rigs, I'd like to throw a few more ideas into the pot. Not that they have been very responsive to my past suggestions... which are still unfulfilled.

For instance, now that voice synthesizer chips are low in cost, isn't it about time that mobile rigs had them built in so we would know what channel we are tuned to when we change? Drivers should not have to look at the rig to see what channel has been selected. In the daytime, it is dangerous enough to have to look down at the rig as you change channels; at night, few of the rigs can be seen even if you want to.

With the increasingly lower cost of microprocessors, isn't it about time that we had some automatically self-diagnosing rigs? With today's chips, it is simple to have an extra one built in whose job is to check on the others, letting the user know if something goes out of specifications. The LCD readout on the set could then indicate the circuit out of parameter so you would know what has gone wrong.

It might be worthwhile on low-band rigs to have the screen alert the operator every now and then when the speech compressor is on. Many operators turn it on and then forget it, putting out a crummy broad signal which isn't any help on short-haul contacts. Something like that might help to clean up the DX bands noticeably.

Now that memory chips are getting so much less expensive, perhaps it's time to put in a log function which would keep track of stations contacted, times, handles, etc., and have them cross-indexed automatically. If any manufacturer is really interested in this concept, I have a surprisingly simple way for the data to be entered that would cost a good deal less than the usual alphanumeric keyboard ...and take up little space. Wouldn't you like to have a rig which would give you instantly the name of the station you are calling and when you last contacted it.

This would also be great for two-meter rigs, including HTs, so that you'd have a cross-index of calls vs. names at hand. It wouldn't take a lot of memory to keep track of a couple hundred repeater users and call their names up on demand.

That ought to keep technicians busy for awhile.

If the manufacturers are slow on the uptake on this, perhaps some readers can design the needed circuits and send 'em in for us to publish, thus doing the work for the manufacturers.

IMPORTING MILITARY TECHNOLOGY

When I wrote about a year ago suggesting that the loss of high technology to Japan could eventually result in America having new weapons designed and built for us in Japan, I got some har-de-har-har letters informing me that I was crazy. It is now revealed that US officials are interested in advanced electronics, fiber optics, laser techniques, and so on, and are looking to Japan for these.

It seems to me that until the US mounts a major program to get kids interested in science and scientific hobbies such as amateur radio, computers, and so on, we are going to continue to fall further and further behind

NO-CODE LICENSE ARRIVES

The no-code license, long a subject of hot debate in amateur circles, took a step closer to reality recently when the FCC proposed two changes in the amateur regulations. One of the Commission's proposals would allow volunteer examiners to conduct amateur tests, a change that was made possible by last fall's legislation.

The Commission suggested two possible alternatives for the no-code license. One would establish a new class of license similar to that of the Canadian Digital class, and the other would eliminate the code requirement from the Technician license.

Neither alternative would allow operation below 30 MHz, and the FCC has requested comments on which frequencies above 30 MHz the new licensees could work. It suggested conferring all amateur privileges above 144 MHz to the Experimenter class or, if the Technician class change is implemented, leaving all privileges above 50 MHz intact.

The Experimenter class test may require more extensive technical knowledge than Technicians need at present; the FCC proposed adding a fifth element to the written test which could be drawn from present test material or written specifically for the new test.

In its proposal, the Commission noted that code is seldom used in the VHF and higher bands, adding that the codeless license might serve as a springboard to higher licenses.

The FCC's proposal for volunteer examiners followed the outline of the ARRL's petition to the Commission, which calls for a three-member team to give the Technician, General, and Advanced tests. The team would be composed of a chief examiner who holds an Extra-class license and two members holding either Advanced- or Extra-class licenses.

Amateurs employed by a publisher or distributor of license study guides, as well as amateurs working for manufacturers or distributors of ham gear, would be prohibited from administering the exams.

The FCC also suggested that "umbrella" agencies be formed to coordinate the volunteer examiner program.

The deadline for comment on the volunteer examiner program falls on April 8, and those wishing to submit comments on the no-code license must do so by April 29.—Avery L. Jenkins WB8JLG.

FCC NEWS

The FCC has paved the way for increased use of experimental digital codes on VHF and relaxed restrictions on ASCII and Baudot transmissions.

In the recent decision, the Commission authorized ASCII up to 56 kilobaud with a bandwidth to 100 kHz on all frequencies above 220 MHz. Between 50 and 220 MHz, the maximum speed is 19.6 kilobaud, and there is no bandwidth restriction.

In addition, experimental codes with a bandwidth of up to 20 kHz are now permitted on the frequencies between 50 and 220 MHz. Previous to this decision, the only permissible codes were ASCII and Baudot. Although the FCC originally wanted to limit the use of experimental codes to domestic transmissions, the final ruling permits their use across the borders of consenting countries such as Canada.

The decision also permits amateurs to use the method of their choosing in determining whether their transmissions fall within the bandwidth limits, and the new regulations do not require continuous monitoring.

Other amendments to Part 97 allow Baudot transmission speed to vary more than 5 words per minute from the standard speeds. The Commission cited the common use of microcomputers rather than electromechanical equipment as the basis of this decision. Frequencies previously limited to F1 have also been opened up to A1 ASCII-coded signals.

The final decision contains several changes from the original proposal. The FCC previously wanted to give its Engineers-in-Charge the power to require amateurs using experimental codes to maintain a record of their communications. However, several public comments noted that the vast amount of material which may be sent by digital methods could be "prohibitively costly to file" and the FFC agreed.

However, hams will still be expected to keep on hand a description of the code which they are using if it is other than ASCII or Baudot.

The Commission also noted that its ability to enforce these new regulations will be hampered by the regulations themselves. "Our ability to verify that the content of messages complies with our rule requirements will be hindered by the broad relaxation of regulatory constraints that we are ordering in these proceedings." However, the FCC added that the "special provisions we are including in the final rules, as well as existing provisions that identification be made in plain English or the international Morse code, should...provide adequate protection."—Avery L. Jenkins WB8JLG.

Scan the World.

NEW

SSB, CW, AM, FM, digital VFO's, 10 memories, memory and band scan, dual 24-hour clocks...

R-2000

The R-2000 is an all mode SSB, CW, AM, FM receiver that covers 150 kHz–30 MHz in 30 bands. New microprocessor controlled operating features and an UP conversion PLL circuit provide maximum flexibility and ease of operation to enhance the excitement of listening to stations around the world. Key features include digital VFO's, ten memories that store frequency, band, and mode information, memory scan, programmable band scan, fluorescent tube digital display, and dual 24-hour clock with timer.

R-2000 FEATURES:

- **Covers 150 kHz–30 MHz in 30 bands.** Uses innovative UP-conversion digitally controlled PLL circuit. UP/DOWN band switches (1-MHz step). VFO's continuously tuneable across 150 kHz–30 MHz.
- **All mode: USB, LSB, CW, AM, FM.** Provides expanded flexibility in receiving various signal types. Front panel mode selector keys, with LED indicators.
- **Digital VFO's for best stability.** 50-Hz step, switchable to 500-Hz or 5-kHz, using front panel pushbutton switches. F. LOCK switch provided.
- **Ten memories store frequency, band, and mode data.** Complete information on frequency, band, and mode is stored in memory, assuring maximum ease of operation. Each memory may be tuned as a VFO. Original memory frequency may be recalled. AUTO. M switch for automatic storage of current operating data, or, when off, selective storage of data using M. IN switch.
- **Lithium battery memory back-up. (Est. 5 yr. life.)**
- **Memory scan.** Scans all memories, or may be programmed to scan specific memories. HOLD switch interrupts scanning. Frequency, band, and mode are automatically selected in accordance with the memory channel being scanned. The scanning time is approximately 2 seconds per channel.
- **Programmable band scan.** Scans automatically within the programmed bandwidth. Memory channels 9 and 0 establish upper and lower scan limits. HOLD switch interrupts scanning. Frequency may be adjusted, using the tuning control, during scan HOLD.
- **Fluorescent tube digital display (100-Hz resolution).** Built-in 7 digit fluorescent tube digital display indicates frequency or time, plus memory channel number. DIM switch provided. The display may be switched to indicate CLOCK-2, FREQUENCY, CLOCK-1, and timer ON or OFF by the front panel FUNCTION switch.
- **Dual 24-hour quartz clocks, with timer.** Permits programming two different time zones. Timer for ON and OFF programming. Timer REMOTE output on rear panel (not for AC power).
- **Three built-in IF filters with NARROW/WIDE selector switch. (CW filter optional.)** 6 kHz wide or 2.7 kHz narrow on AM. 2.7 kHz automatic on SSB. 2.7 kHz wide on CW, or, with optional YG-455C filter installed, 500 Hz narrow. 15 kHz automatic on FM.
- **Squelch circuit, all mode, built-in, with BUSY indicator.**
- **Noise blanker built-in.** Eliminates pulse-type noise on SSB, CW, and AM.
- **Large front mounted speaker.**
- **Tone control.**
- **RF step attenuator. (0-10-20-30 dB.)** Four step attenuator, plus antenna fuse.
- **AGC switch. (Slow-Fast.)**
- **"S" meter, with SINPO "S" scale.**
- **High and low impedance antenna terminals.** A high impedance (500 ohm) terminal, and a low impedance (50 ohm) co-axial connector are provided.
- **100/120/220/240 VAC, or 13.8 VDC operation.** (Optional DCK-1 cable kit required for 13.8 VDC.)

Other features.
- RECORD output jack.
- Audible "beeper" (through speaker).
- Carrying handle.
- Headphone jack.
- External speaker jack.

Optional accessories:
- HS-4, HS-5, HS-6 headphones.
- DCK-1 DC cable kit.
- YG-455C 500-Hz CW filter.
- HC-10 World digital quartz clock.

More information on the R-2000 is available from all authorized dealers of Trio-Kenwood Communications
1111 West Walnut Street
Compton, California 90220.

KENWOOD

...pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.

STAFF

PUBLISHER/EDITOR
Wayne Green W2NSD/1
EXECUTIVE VICE PRESIDENT
Sherry Smythe-Green
ASSISTANT PUBLISHER/EDITOR
Jeff DeTray WB8BTH
MANAGING EDITOR
John Burnett
ASST. MANAGING EDITOR
Susan Philbrick
EDITORIAL ASSISTANTS
Nancy Noyd
Richard Phenix
Steve Jewett
TECHNICAL EDITOR
Avery L. Jenkins WB8JLG
ASSISTANT TO THE PRESIDENT
Matthew Smith KA1IEI
ASSOCIATES
Robert Baker WB2GFE
John Edwards KI2U
Bill Gosney KE7C
Sanger Green
Chod Harris VP2ML
Dr. Marc Leavey WA3AJR
J. H. Nelson
Bill Pasternak WA6ITF
Peter Stark K2OAW

PRODUCTION MANAGER/ PUBLICATIONS
Nancy Salmon
ASST. PRODUCTION MANAGER/PUBLICATIONS
Michael Murphy
ADVERTISING GRAPHICS MANAGERS
Scott W. Philbrick
Fiona Davies
Bruce Hedin
Jane Preston
CREATIVE DIRECTOR
Jonathan Graves
DESIGN DIRECTOR
Christine Destrempes
PRODUCTION
Frances Benton
Katherine Coker
Linda Drew
Denzel Dyer
Michael Ford
Phil Geraci
Donna Hartwell
Kimberly Nadeau
Paula Ramsey
Dianne K. Ritson
Anne Rocchio
Mary Seaver
Deborah Stone
Theresa Verville
David Wozmak
Karen Wozmak
PHOTOGRAPHY
Thomas Villeneuve
Sandra Dukette
Laurie Jennison
Irene Vail
Robert M. Villeneuve
TYPESETTING
Sara Bedell
Marie Barker
Melody Bedell
Michele DesRochers
Jennifer Lee Fay
Prem Krishna Gongaju
Lynn Haines
Linda Locke
Nancy Wilson-Newman
Debbie Nutting
Lindy Palmisano
Susan Weller

GENERAL MANAGER
Debra Wetherbee
CONTROLLER
Roger J. Murphy
ACCOUNTING MANAGER
Knud Keller KV4GG/1
CIRCULATION MANAGER
Patricia Ferrante
603-924-9471
BULK SALES MANAGER
Ginnie Boudreau
1-(800)-343-0728
ADVERTISING
603-924-7138
Jim Gray W1XU, Mgr.
Nancy Ciampa, Asst. Mgr.
Ross Kenyon KA1GAV
Cornelia Taylor

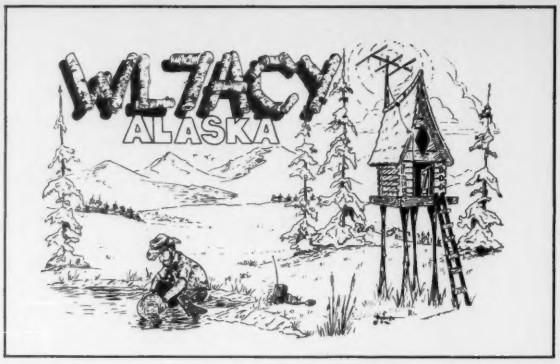
Japan in technology. Sure, we're outproducing them in lawyers by about the same numbers as they are outdoing us in engineers and technicians. Perhaps we're going to sue for technology.

CRAPPY AMERICAN PRODUCTS?

I received a letter from a major ham dealer in New Zealand in response to my editorial suggesting that there is need for more engineers and technicians if we are ever going to regain our amateur radio equipment (and other consumer electronic equipment) sales. Of course I didn't suggest this is the *only* problem slowing the sales of American equipment. No, there are several factors which need fixing, such as a tax situation which will allow American firms to spend more on R&D and on growth (which means more jobs).

The letter from New Zealand makes some very pertinent points. There are some exceptions, but in general the quality of products from Japan puts American products to shame. Compare the American equipment side by side with the Japa-

Continued on page 126



QSL OF THE MONTH

This month's QSL contest winner is Dave Shiplett WL7ACY in the frozen north country of Alaska. His card depicts a grizzled 49er panning for gold while listening to an HT propped against a nearby rock. The scene may not be exactly typical of modern Alaskan life, but it quickly identifies the location of David's station. The callsign is made from birch logs, which is a common wood in the Fairbanks area, and the card is drawn by a local artist.

If you would like to enter *73*'s QSL of the Month Contest, put your card in an envelope with your choice of books from *73*'s Radio Bookshop and mail it to *73*, Pine Street, Peterborough NH 03458, Attn: QSL of the Month. Entries not sent in an envelope or without a book choice will not be considered.

Well . . . I Can Dream, Can't I? **by Bandel Linn K4PP**

"We're glad you're interested in the apartment! There's one small problem, though . . . a 100-foot tower in the backyard!"

At Last.

A microthin, synthesized, programmable, sub-audible tone encoder that fits inside the ICOM IC-2AT.

Need we say more?

$29.95

VISA

COMMUNICATIONS SPECIALISTS ⌐15

426 West Taft Avenue, Orange, CA 92667
800/854-0547 California: 714/998-3021

More kit quality

A triumph of price and performance – Heath's new HW-5400 Synthesized HF SSB Transceiver kit makes high technology affordable. With more versatile, far-reaching capabilities, it puts the original skill and adventure back into Amateur Radio...

HW-5400 Transceiver

Heath breaks the price barrier on sophisticated transceivers, offering the highest value for your hamshack dollar. The slim, new HW-5400 is a marvel of kit-form engineering that performs like a dream on 80-10 meters.

MORE ADVANCED IDEAS

Solid state and broadbanded, the HW-5400 incorporates more performance-improving features at a lower price than any comparable transceiver. It's fully synthesized for crystal stability and accuracy. Operating in USB, LSB and CW with automatic sideband selection, it has full break-in (QSK) for proficient keyers, two memories per band, power supply activation at the Transceiver, defeatable amplifier relay, reverse and over voltage protection as well as high VSWR forward power cut-back circuitry for the finals.

A custom microprocessor yields flexible, fingertip control over all phases of T/R operation.

MORE CONVENIENCE

This perfection-packed kit has many benefits. A unique dual-speed tuning system can extract new QSOs or fly through a band in 1 kHz increments with 50 Hz resolution! *Split-Memory Access* lets you review and change the transmit frequency while in receive, without missing a single word or fragment of code. With it, you can beat the QRM every time. Essential vox and sidetone controls are located behind the front panel nameplate. Seven mode and function symbols confirm transceiver status at a glance.

The HW-5400's Frequency Entry Keypad option allows directly-synthesized QSY to any point in the band, and permits fast DX control when used with the Split Memory function. The matching HWA-5400-1 Power Supply/ Speaker & Digital Clock (not shown) provides a double-fused source of 13.8 VDC from 120 or 240 VAC.

MORE ENJOYMENT

Novice or active pro, the HW-5400 is perfect for operators who want a Transceiver that's second to none, plus the pride, knowledge and satisfaction that come from building it yourself with our world famous step-by-step manuals. You may find it to be the first microprocessor-controlled rig with enough potential to match the level of professionalism in every radio amateur!

MORE DETAILS IN CATALOG

FREE! For complete details and specs, get a copy of the latest Heathkit catalog. Remove and mail the coupon today or write: Heath Company, Dept. 011-994, Benton Harbor, MI 49022. Visit your local Heathkit Electronic Center* for an exciting hands-on tryout.

There's more for the Ham at Heath

Also see our state-of-the-art SS-9000 Deluxe HF Synthesized Transceiver (pictured below), which can be controlled by a computer or ASCII terminal.

***Units of Veritechnology Electronics Corporation in the U.S., a subsidiary of Zenith Radio Corp.**

☐ Please send me a FREE Heathkit catalog.

Mail to:
Heath Company, Dept. 011-014
Benton Harbor, MI 49022

Name _____

Address _____

City _____

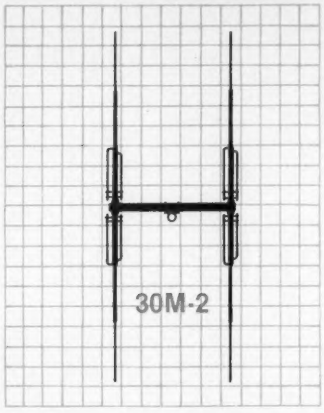
State _____ Zip _____

AM-436

Heathkit®

303

KLM 30 Meter Monoband Yagis



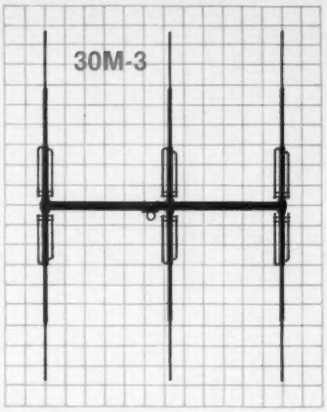
KLM is proud to announce two new high performance monobanders for 30 meters. The KLM 30M-2 and 30M-3 are carefully designed to combine moderate size with superior performance. Either of these compact powerhouses can be a valuable addition to your antenna system without overloading the tower or rotator.

■ Construction materials feature strong 6063-T832 alloy aluminum element and boom tubing, massive Lexan insulators, and stainless steel hardware for years of reliable service.

■ A DC grounded Beta match and KLM's proven 4:1 DC grounded Balun make the 30M-2 and 30M-3 as lightning/static proof as possible. The unique linear loading system keeps element lengths manageable without sacrificing performance.

■ The adventure of a new band awaits you. Double your pleasure with the great gain and broadband response of the KLM 30M-2 or 30M-3. See your KLM dealer now!

KLM Electronics, Inc.
P.O. Box 816,
Morgan Hill, CA 95037
(408) 779-7363



30M-2: SPECIFICATIONS
Bandwidth: **10.1 to 10.150 MHz**
Gain: **4.5 dBd**
VSWR: **less than 1.5:1**
F/B: **12 db**
Feed Impedance: **50 ohms**
Element length: **35'3"**
Boom: **3"0.D. x 12'**
Turn Radius: **18'6"**
Weight: **35 lbs**
Windload: **4 sq ft**

30M-3: SPECIFICATIONS
Bandwidth: **10.1 to 10.150 MHz**
Gain: **7 dBd**
VSWR: **less than 1.5:1**
F/B: **20 dB**
Feed Impedance: **50 ohms**
Element length:**35'3"**
Boom: **3"O.D. x 24'**
Turn Radius: **21'5"**
Weight: **50 lbs**
Windload: **7 sq ft**

FAST SCAN

$399

Have you tried it yet?
ATV TRANSMITTER/CONVERTER

TC—1

*10 Watts Output
*Standard Frequencies Available
*Broadcast Standard Sound
*High-resolution & color video
*Regulated AC Supply Built In
*Tuneable Downconverter & Preamp

Connect to the antenna terminals of any TV set, add a good 450 MHz antenna, a camera and there you are. . . Show the shack, home movies, computer games, video tapes, etc.

ATV DOWNCONVERTER

For those who want to see the ATV action before they commit to a complete station, the TVC-4 is for you. Great for public service setups, demos, and getting a buddy interested. Just add an antenna and a TV set tuned to CH. 2, 3, or 4 and plug in to 117 volts a.c. **$89.00**

TVC-4

TVC-4L extra low-noise version. . . $105 delivered in USA

HOMEBREWERS: ASK FOR OUR BASIC FOUR-MODULE PACKAGE

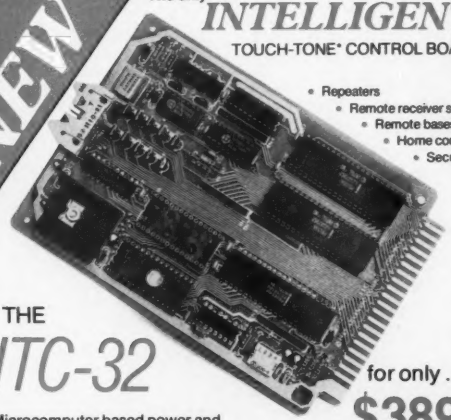
CALL OR WRITE FOR OUR COMPLETE LIST OF SPECIFICATIONS, station set-up diagrams, and optional accessories which include antennas, modulators, detectors, test generators, cameras, etc. WE ARE A FULL-LINE SUPPLIER OF ALL YOUR ATV NEEDS.
TERMS: VISA or MASTER CARD by telephone or mail, or check or money order by mail. All prices are delivered in USA. Allow three weeks after order for delivery.

P.C. ELECTRONICS
Tom W6ORG Maryann WB6YSS
(213) 447-4565
2522 Paxson Lane,
Arcadia, California 91006

NEW

The only ***INTELLIGENT***
TOUCH-TONE* CONTROL BOARD

- Repeaters
- Remote receiver sites
- Remote bases
- Home control
- Security



THE
ITC-32
for only . . .
$389

Microcomputer based power and flexibility with state-of-the-art Mitel tone decoding.

- 28 remotely commandable outputs
- 4 remotely sensed inputs
- Control and monitor over the air or over the telephone**
- Morse code or tone encoded response messages
- Alarm generation
- PLUS Repeater COR/ID/Timer function!

acc advanced computer controls

Call or write for detailed specs on the ITC-32 Intelligent Touch-Tone Control Board.

10816 Northridge Square, Cupertino, CA 95014
(408) 749-8330

* Touch-Tone is a registered trademark of AT&T
** Optional Telephone Interface Board available
Price and specifications subject to change without notice or obligation.

67

See List of Advertisers on page 114

Charles W. Lobb KN6H
1843 W. 244th Street
Lomita CA 90717

Pedal Power: A Perfect Field-Day Generator

This bicycle-driven power source is easy to build and guaranteed to get you in shape. No heavy breathing into the mike, please.

Five QSOs by "natural power." That's all you need for 100 Field-Day bonus points. Did you or your club lose out on those "give-away" points last year? Probably figured it was way beyond your means, right? I mean, how many clubs can sport solar panels, wind generators, Pelton water wheels, or some other exotic power scheme?

Well, phooey. You missed a real giveaway if you skimmed that lightly over this one. You can easily scrounge enough stuff for a real fun-powered machine, even run a contest-within-a-contest if you wish. Let's take a closer look.

Rules

Field-Day rules state that the 100 natural-power bonus points can be earned by completing a minimum of five QSOs without using power from commercial mains or petroleum derivatives. This intuitively means alternate energy sources such as solar, wind, methane, grain alcohol, etc.

How about muscles? Don't they qualify? Especially grain-alcohol-powered muscles. There are usually plenty of 'em around a typical Field-Day site, most standing around getting flabby while their owners fuel themselves with some of those non-petroleum derivatives. Think you're *too* flabby? Heck, it's only five QSOs, and surely there's enough activity on 2 meters or 220 in your area for that. Besides, with a little imagination you can set up a simple contest within your group for the highest number of muscle-powered QSOs (with a suitable handicap for those more heavily fueled).

Muscle Power

In your club or group someone undoubtedly has a small, mobile VHF rig or converted CB. (Single-sideband QRP rigs are ideal, since power demands come in bursts and average power is quite low.) In our club, there are about 40 Midland 13-509s available thanks to a group buy a couple of years ago. On low power (one Watt output), this 220-MHz

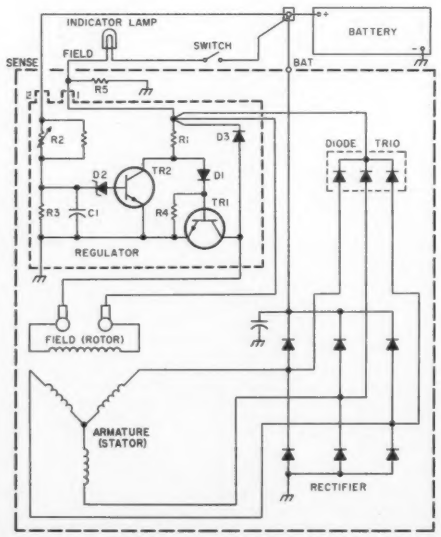


Fig. 1. Alternator schematic diagram.

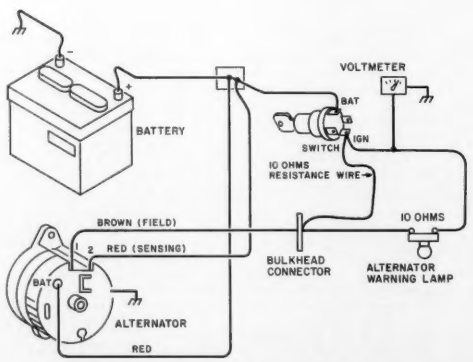


Fig. 2. Typical automobile charging circuit.

rig requires only 1.1 Amps at 13.8 V dc, panel lamps and all. That's 15.2 Watts, or about 0.02 horsepower. On high power (ten Watts), the current zooms to 3.1 Amps, about 0.06 horsepower. Unfortunately, FM means a continuous carrier, but gad, even the flabbiest beer stomach can produce 0.02 horsepower in just one hefty belch! For five QSOs, however, it may take a bit more. Besides, you ought to be listening more than you're transmitting. So how do we turn beer-power into five QSOs? All it takes is a little imagination and some scrounging.

Design

At lunch one day a bunch of club members began to kick around a few ideas, and soon the ingredients for a beer-powered machine began to evolve. An old Delco-Remy alternator was volunteered from one junk box, a little-used exercise bike came from another, and a spare V-belt materialized from the trunk of a car right there in the parking lot. Even a loaner 13-509 was arm-twisted away from its owner in the enthusiasm of the moment.

The pieces began to fall into place. It was decided that it should be rigged so the guy pedaling also had to make the QSOs, all by himself. That way we could run a contest for the greatest number of self-powered contacts. But more about that later. Let's get on with building this contraption.

The Bike

The bike selected should have some means of solidly driving a V-belt. The key word here is "solidly." You'll want to cut all the power losses you can between legs and rig, so no slippage. A multi-speed bike with the rear rim used as a pulley would be ideal, since the gear ratio can be adjusted for the load. The hardest part will be improvising a stand to hold the rear wheel clear of the ground while providing a solid and stationary support for a pedaling rider.

An exercise cycle neatly solves the stationary stand problem, but usually does not provide a gearing adjustment for comfortable pedaling. Nonetheless, since it was free, we opted for the exercycle. The pedaling speed needed to be largely constant to hold the alternator at a constant rpm and could therefore be adjusted by selecting a proper drive-sprocket diameter. A local bike shop proved very happy to help—at no cost—when they understood what we were doing.

If you plan to use an exercise bike, the first step is to disable the friction, weight, or loading mechanism used to increase pedal load. It's going to be hard enough keeping the alternator going. The next step is to decide how best to drive the V-belt. The easiest method is probably to remove the tire and use the rim as a drive pulley. Belt slippage should be no problem even without side contact if the belt is kept reasonably taut. The area of bottom surface contact is large enough to provide sufficient friction.

In our case, however, the semi-pneumatic tire of the exercise bike proved impossible to remove without destroying it. The belt could be driven by grooving the tire, but again that meant destruction. The solution was found in another scrounging trip to the bike shop junk box. A 12" spokeless rim from a kid's bike was unearthed, a rim slightly smaller than the 15" wheel on the exercycle. All that had to be devised was a method of clamping it to the side of the exercise bike wheel. This was done by carefully centering the 12" rim on the 15" wheel and marking points where holes should be drilled for screws, washers, and nuts to be installed as

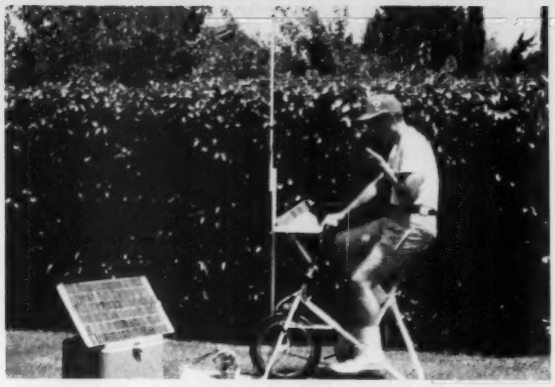


Photo A. The author piling up natural-power QSOs. Note the fuel supply located beneath the solar panel.

clamps to the 15" spokes. Ten such points were marked and drilled and the rim mounted with #8 screws, flat washers, and nuts.

Exact centering of this side-mounted rim is not too important since the speed will be low (about 400 rpm) and some wobble can be tolerated. Be sure, however, that (a) there is clearance for the add-on rim inside the fork, and (b) the V-belt can subsequently be brought forward clear of the tire. Locate the clamping screws alongside the spokes such that the pull on the belt will tend to pull the screws into the spokes, not away from them, or the whole works may slip off the first time the belt is loaded.

Old-timers may recall the popular "Whizzer" bicycle motor of the late 40s and early 50s. The Whizzer motor was mounted on the frame and drove the rear wheel through a V-belt pulley clamped to the spokes. Award yourself a "Scrounge First Class" medal if you can locate one of these old Whizzer pulleys. The enormous V-belt from the Whizzer would be great, too.

The Alternator

Deciphering the innards of an alternator takes just a bit of head-scratching. Our scrounged Delco-Remy was a type with an internal voltage regulator. A schematic diagram and circuit description located in a GM truck maintenance manual proved to be a valuable reference for devising external circuitry for this alternator. The discussion below should apply to whatever type you can scrounge. If you must buy, look for a rebuilt alternator with internal regulator frequently on sale at automobile parts houses in the $20–$25 price range.

Our Delco-Remy produced 3-phase ac in the stator that is rectified by six diodes to produce clean, low-ripple, no-whine dc. Regulation is accomplished by sensing the output dc and adjusting the field (rotor) current to hold the output constant over a wide range of speeds and loads. By fixing the high-current stator and spinning the low-current field winding, brushes and slip rings can be kept small, lasting almost indefinitely. Fig. 1 shows the internal alternator schematic, and Fig. 2 its normal hookup in an automobile.

There are three external terminals, a post labeled "BAT," the positive high-current stator output, and two push-on spade lugs labeled "1" and "2", the field and regulator sense inputs, respectively. All US-made alternators are designed for clockwise rotation, looking in at the pulley end of the shaft.

After studying the automobile hookup of Fig. 2, a

Photo B. The operator's control panel. The transceiver is running directly off the solar panel (see text).

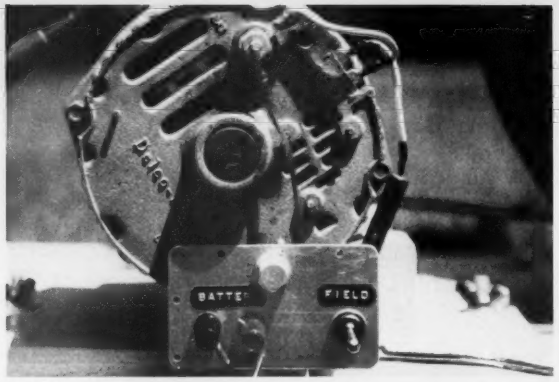


Photo C. The alternator control panel. The field-current source is connected to the BATTERY terminals. The FIELD switch opens the field circuit (see text).

circuit was devised for the bike-powered version as shown in Fig. 3. Start-up field current proved to be the biggest problem, since this is normally supplied from the automobile battery. A close examination of Fig. 1, however, indicates that three internal diodes (labeled "Diode Trio") provided field current when running. These will only work, however, once the alternator stator is producing an output. From a dead stop, no field current is available, so a source of 12 volts must be temporarily connected to terminal 1, then removed after the alternator is up to speed. A switch was therefore included with a START position to initially connect the 12-volt source to the field and a RUN position to open the field line once up to speed. (The extra load on the legs was very noticeable if left in the START position.) To limit field current during start, a 10-Ohm, 10-Watt resistor was included in the place of the automobile alternator warning lamp normally used for the purpose.

The necessity for this external 12-volt source of field current took us back to a careful reading of the Field-Day rules. If we used a battery here, even if only momentarily, would we no longer be natural power? And what if the battery was connected permanently? Happily, the problem disappeared when a small solar panel built of scrap spacecraft solar cells was scrounged from another trip to the junk box. This panel provided more than ample field current, and in fact worked so well that an alternate circuit was improvised to allow running the 13-509 directly off the panel without the alternator. For this mode, another series switch labeled FIELD was added to open the field circuit with the START switch closed, so the alternator field winding would not load down the solar panel. See Fig. 3 and Photo C. (Incidentally, the 15" by 30" solar panel proved adequate to run a 13-509 on high power most of the day, continuing on low power through dusk.)

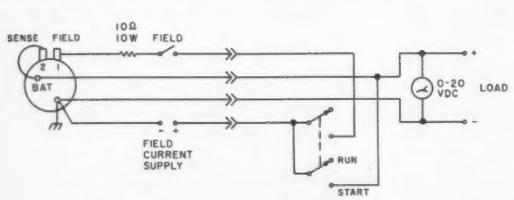


Fig. 3. Schematic/pictorial diagram (the 4-pin connector provides for disassembly).

Mechanical Design

Once the electrical design had been completed, attention turned toward mounting and assembly. A small 10" by 12" tray was fabricated and secured between the handlebars, as shown in Photos A and B. A 7" by 8" stand, angled upward at 40°, was placed on the tray to provide a more convenient viewing angle for the 13-509 front panel and a surface to mount the START-RUN switch, a 0-20-V-dc voltmeter, and the microphone bracket (see Photo B).

The alternator was bolted to a 14" by 20" piece of ¾" plywood which, in turn, was attached with U-bolts to the front foot of the exercise bike (Photo A). By leaving some slack in the U-bolts, the weight of the alternator provided sufficient tension on the V-belt to maintain positive drive, even with some wobble in the bike drive pulley.

Final Adjustments

A final tweaking was required, as mentioned earlier, in pedal speed. The original 7" exercycle pedal sprocket required an uncomfortably high pedal speed for satisfactory operation. Simple proportions between sprocket and pulley diameters can be used to determine the relation between pedal rpm and alternator rpm. (You can also count sprocket teeth and ratio them, if you wish, but diameters are easier.)

Example: Pedal sprocket diameter = 7"; wheel sprocket diameter = 2¾"; wheel pulley diameter = 12"; alternator pulley diameter = 2".

For an alternator speed of 2500 rpm, the wheel pulley speed would be 2500 × (2"/12") = 417 rpm. Since the wheel sprocket and wheel pulley must rotate at the same speed (they are on the same hub), the pedal sprocket speed would be 417 × (2¾"/7") = 164 rpm, about 3 revolutions per second.

Three rps proved to be uncomfortably fast and riders were hard pressed to keep it up very long even with no load. The bike shop once again supplied the answer from its junk box. An enormous 10½" pedal sprocket, installed in place of the original 7" one, brought the pedal speed down to a very comfortable 109 rpm, or less than 2 revolutions per second. This proved so comfortable, in fact, that there was virtually no noticeable increase in load on the legs when the 13-509 was switched on at low power and a barely perceptible leg load on high power. One flabby beer-drinker, microphone in one hand and 807 in the other, completed the required five QSOs before half finishing his 807!

HUSTLER
HF MOBILES DELIVER FIXED STATION PERFORMANCE

Hustler HF antennas deliver outstanding signal reports — wherever you're mobile!

Design your own HF mobile from a full selection of top-quality; U.S.-made stainless steel ball mounts, quick disconnects, masts, springs, and resonators. You can cover any 6-to-80-meter band. Choose from medium or high power resonators with broadest bandwidth and lowest SWR for optimum performance on any band. Easy band change and garaging with Hustler's fold-over mast, too.

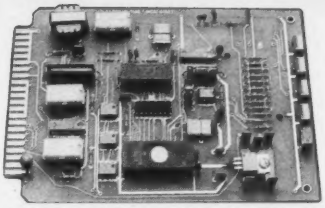
Ask any ham — the best HF mobiles on the road come from: Hustler — still the standard of performance.

HUSTLER®

3275 North "B" Avenue
Kissimmee, Florida 32741

An ARMATRON Company

Micro Processor Repeater Control



Features: **NEW!!**

- ★ COR
- ★ Automatic I.D.
- ★ 16 digit selectable command codes
- ★ Field Programmable
- ★ Auto Patch Tone & Rotary Dial
- ★ Reverse Autopatch
- ★ Autodialer
- ★ Repeater Timers
- ★ 12 Volt Operation
- ★ 150 MA Current Drain
- ★ Many more features included

MCD 01 *"The Affordable Controller"*
Call or Write for immediate delivery.

Price $549.00 (Complete)

Micro Concepts & Designs Co.
P.O. Box 19786
Orlando, FLA. 32814
Phone (305) 298-3026 ↙227

HAVE RTTY—WILL TRAVEL

Yes, now you can take it with you! The new **HAL CWR-6850 Telereader** is the smallest RTTY and CW terminal available, complete with CRT display screen. Stay active with your RTTY and CW friends even while traveling. Some of the outstanding features of the CWR-6850 are:

- **Send and receive ASCII, Baudot, and Morse code**
- **RTTY and Morse demodulators are built-in**
- **RTTY speeds of 45, 50, 57, 74, 110, and 300 baud**
- **High or Low RTTY tones**
- **Send and receive CW at 3 to 40 wpm**
- **Built-in 5 inch green CRT display**
- **Four page video screen display**
- **Six programmable HERE IS messages**
- **Pretype up to 15 lines of text**
- **External keyboard included**
- **Runs on +12 VDC @ 1.7 Amperes**
- **Small size (12.75″ × 5″ × 11.5″)**

Write or call for more details. See the CWR-6850 at your favorite HAL dealer. ↙345

HAL

HAL COMMUNICATIONS CORP.
BOX 365
URBANA, ILLINOIS 61801 **217-367-7373**

↙See List of Advertisers on page 114

Antenna

The antenna can be almost anything suitable for your Field-Day location. Since we were at a 1500-foot elevation overlooking the Los Angeles basin, a simple home-brew quarter-wave spike with ground plane proved more than adequate to reach all corners of the basin, full quieting. Number 12 solid copper house wire was used for the spike and radials on an upside-down SO-239 connector, as shown in Photo D. A simple angle-bracket and wood pole completed the installation as shown in Photos A and D. For the 220-MHz band, the lengths chosen were about 13" for all elements. At 144 MHz, try 19½", or consult the *Handbook* for something more exotic.

Photo D. The home-brew ground-plane antenna. Radials are #12 house wire.

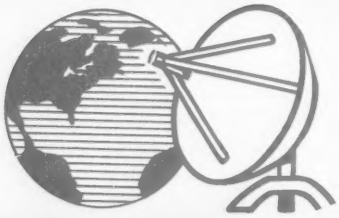
Fuel

Adequate fuel for any Field-Day endeavor must be provided, and Photo A shows the solar panel mounted on an ice chest containing the necessary supply.

For a fun competition, set up something such as the greatest number of QSOs per rider before exhaustion. Each 807 consumed might also be counted as a QSO if the flabbier pedalers are to be competing with the athletes. Warning: On VHF, the first few riders will grab off the easiest simplex contacts, so serious competitors should be allowed first crack at these. If you're on ten meters with a converted CB, how about an award for the longest-distance DX, most states per rider, or some such.

As an exercise in computing how much leg power is involved in a horsepower, consider this. The 13-509 on high power transmit consumes 13.8 V × 3.1 Amps = 43 Watts, about 0.06 horsepower. This is about the point where leg pressure becomes noticeable. At 5 Amps (about 0.1 horsepower), it's *very* noticeable, and at 10 Amps, it's almost impossible to maintain for an average middle-aged ham for even a minute. The pilot (and engine) who pedaled the Gossamer Albatross across the English Channel, Mr. Bryan Allen, developed 0.9 hp for over two hours, an equivalent of 49 Amps! That'll give you something to chat about during your five bike-powered QSOs. (I hope Bryan doesn't show up for our contest. Is he a ham?)

Good luck, and may your club have as much fun as we did with this rig. Who knows, we may score a first with a two-way 807-fueled bike-to-bike contact! Or with good 10-meter openings, perhaps bike-powered WAC or WAS! ■



SATELLITE TELEVISION SYSTEMS

WE WILL NOT BE UNDERSOLD!!
Complete Systems, Antennas, Receivers, LNA's & Accessories
CALL US TODAY! ↩320
812-238-1456

hoosier electronics
"Nation's Largest Total Communications Distributor"
P.O. BOX 3300 • TERRE HAUTE, INDIANA 47803

2300 MHz

BUILT CONVERTER ANTENNA POWER SUPPLY NOW 77.90

KIT PC BOARD ALL PARTS DOWN CONVERTER 9.95

DISK YAGI ANTENNA $12.95
COMPLETE KIT WITH PVC AND MOUNTING BRACKET

POWER SUPPLY $15.95
VARIABLE 4 TO 15 VOLTS

ALUMINUM CABINET $6.95
ANODIZED BLACK WITH BRUSHED FINISH
ALL HOLES ARE PRE-PUNCHED

BUILT CONV BOARD $22.50
BUILT P/S & CABINET $34.95
COMPLETE SYSTEM BUILT $77.90

TRIONYX INC
6219 COFFMAN RD ↩104
INDIANAPOLIS, INDIANA 46268
317 291 7280
AE VISA
ADD $5.00 FOR SHIPPING & HANDLING
NO COD
PHONE OR MAIL ORDER

ANNOUNCING

PRIVATE PATCH II

TONE TO PULSE SIMPLEX INTERCONNECT

AT LAST...Professional quality interconnect at an *affordable* price! Imagine the convenience of having your own private, commercial quality mobile telephone in your car. And without the hassles of shared systems. Put your base FM transceiver to work while on the road. Our *ultra state of the art* digitally processed audio scheme (Patent pending) *totally* eliminates the continuous train of squelch tails which has kept you away from sampling interconnects. Our nonsampling approach has additional benefits: 1. Interface to your transceiver is the MOST SIMPLE EVER. Connects only to microphone and speaker jacks! NO INTERNAL CONNECTIONS OR MODIFICATIONS REQUIRED! 15 minutes typical installation time. 2. Works with ANY FM transceiver. (T/R speed is not critical.) 3. Operates through any repeater or simplex without use of tone equipment. Imagine having TOTAL access to your own home phone from 100 miles away! Our *busy channel ringback inhibit logic* prevents "accidental" interference to a QSO in progress when a phone call is received. This feature will keep you out of hot water with co-channel users! Discover for yourself what high quality simplex interconnect sounds like. Call us, and listen to actual "on the air" tapes of this incomparable interconnect product.

STANDARD FEATURES

- Compatible with either rotary or tone exchanges
- 16 Digit buffer memory — dial as fast as you want
- 3201 tone decoder chip
- High quality glass circuit board
- CW identification

- Five digit user programmable sequential access code — 60,000 code combinations
- Sophisticated toll restrict — restricts any quantity of leading digits
- Both accessing and dialing are compatible with speed dialing equipment
- Operates superb through repeaters — no special tone equipment required
- Three/six minute "time out" timer is resettable from mobile four CW ID warnings during last minute
- Ringback (reverse patch) pages you once with CW ID — answer when convenient with your access code
- Busy channel ringback inhibit logic — prevents accidental interference to QSO in progress
- Most easily interfaced autopatch on the market
- Positive control logic
- Fully digital timing — there are *no* timing adjustments! assures quick easy set-up
- Touch tone™ digits and strobe pulse available on DIP socket
- Modular phone jack and cord
- Self contained 115 VAC supply (230 VAC 50/60 cycle export model available)

PRIVATE PATCH II $475

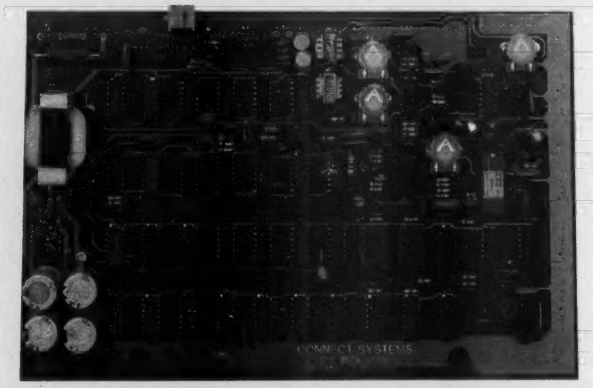
NOW REDUCED

PRIVATE PATCH I $399

HAS MOST OPERATIONAL FEATURES OF PRIVATE PATCH II — BUT IS FOR USE ONLY ON DTMF EXCHANGES

AND OF COURSE:

ONE YEAR WARRANTY
14 DAY RETURN PRIVILEGE
UNMATCHED CUSTOMER SERVICE



QUALITY AND ENGINEERING...
THAT YOU CAN DEPEND ON!!

SEND OR CALL FOR BROCHURES
INQUIRE ABOUT COMMERCIAL MODELS

DEALERSHIPS INVITED

Connect Systems

Formerly Auto Connect

P.O. BOX 4155
TORRANCE, CA 90510
PHONE (213) 540-1053

The Standard for Comparison

New AZDEN® PCS-300

2-M Handheld FM Transceiver

8 MHZ COVERAGE • 142 to 149.995 MHz in 5 kHz steps, including CAP and MARS.

IDEAL SIZE & WEIGHT DISTRIBUTION • 7.3" high by 2.5" wide by 1.8" deep; 1.4 lbs.

MICROCOMPUTER CONTROL • All frequency operations are done by means of a microcomputer keyboard with acquisition tone.

LCD DISPLAY WITH TIMED LAMP • Draws almost no current. Lamp times out automatically after 20 seconds.

16 KEY AUTOPATCH • Keyboard works as a Touchtone® pad while transmitting.

PL TONE SWITCH • Actuates optional subaudible tone module.

PROGRAMMABLE "ODD SPLITS" • Transmit and receive on any possible frequency combination. Reset in seconds.

9 CHANNEL MEMORY WITH SCAN • Eight addressable channels and one externally accessible up/down channel retain frequency and standard offset. Backup drain is a scant 10 microamps!

AUTOMATIC INCLUSIVE OR EXCLUSIVE PROGRAMMABLE BAND SCAN • Limits may be reset in seconds. Scans either inside or outside the limits.

BUSY AND VACANT SCAN MODES • Scan for either an occupied or empty frequency.

KEYBOARD LOCK • Prevents accidental change of frequency or scan status.

TRANSMIT LOCK • Avoids unintentional transmission.

DIGITAL S/RF AND MEMORY ADDRESS METER • Shows relative signal strength on receive, relative power on transmit. Also shows memory address.

HIGH OR LOW POWER • 3 watts high, 1 watt low. Low power is continuously adjustable from 0.5 to 3 watts.

TRUE FM • Not phase modulation – Unparalleled audio quality.

AUTOMATIC FRONT END TUNING • RF stage is varactor tuned for superior sensitivity and selectivity.

RUGGED COMMERCIAL-GRADE MODULAR CONSTRUCTION The PCS-300 is built to take years of the toughest operating conditions.

SUPERIOR RECEIVER • Sensitivity is 0.25 uV for 20 dB quieting, 0.2 uV for 12 dB SINAD.

BNC ANTENNA CONNECTOR •

STANDARD ACCESSORIES • Heavy duty NICAD battery pack (500 mAh), belt clip, hand strap connector, flexible rubber antenna, earphone, ac charging unit, and special stand for table-top operation.

OPTIONAL ACCESSORIES • Deluxe leather case, mobile dc charging cord, external speaker/microphone, and PL tone module.

MANUFACTURER: AZDEN JAPAN PIEZO CO., LTD. No. 12-17, 1-chome, Kami-Renjaku, Mitaka, Tokyo, Japan, Telex: 781-2822452

EXCLUSIVE DISTRIBUTOR: AMATEUR-WHOLESALE ELECTRONICS, INC. 8817 S.W. 129 Terrace, Miami, Florida 33176 Telephone (305) 233-3631 Telex: 80-3356. Toll-free (800) 327-3102

WHAT EVERY LISTENING STATION NEEDS

APARTMENT DWELLERS, TAKE NOTE!

$59.95

Includes loop antenna and built-in preamplifier with 1 MHz and 100 kHz crystal calibrator. 1.5 - 30 MHz coverage.

THE NEW NXL-1000 NOISE-CANCELLING INDOOR SHORTWAVE ANTENNA

Now you can pull in signals from all over the world without erecting an outside antenna! The new NXL-1000 uses a shielded loop (one foot in diameter, located on the top of the unit) and a built-in preamplifier to offer performance equal to a long wire antenna. In addition, the shielded loop inherently cancells man made noise, and it can be tilted and turned to null out interfering noise sources. Also, as an added bonus, the NXL-1000 comes with a crystal calibrator built-in, a must for calibration of non-digital receivers. It all adds up to this: no shortwave listening station is complete without the NXL-1000 - the "Superloop".

CONTEMPORARY ELECTRONIC PRODUCTS

P.O. Box 570549
Miami, Florida 33157 ✓184
(305) 255-7660

VISA MasterCard

DEALERS WANTED

HI-Q BALUN

- For dipoles, yagis, inverted vees & doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz
- Small, lightweight and weatherproof
- 1:1 Impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector

only $12.95

HI-Q ANTENNA CENTER INSULATOR

Small, rugged, lightweight weatherproof
Replaces center insulator
Handles full legal power and more
With SO 239 connector

$6.95

HI-Q ANTENNA END INSULATORS

Patent No 4 091 350

Rugged, lightweight, injection molded of top quality material, with high dielectric qualities and excellent weatherability. End insulators are constructed in a spiral unending fashion to permit winding of loading coils or partial winding for tuned traps.

May be used for
- Guy wire strain insulators
- End or center insulators for antennas
- Construction of antenna loading coils or multiband traps

$4.95

DIPOLES

MODEL	BANDS	LENGTH	PRICE WITH HI-Q BALUN	WITH HI-Q CENTER INSULATOR
Dipoles				
D-80	80,75	130	$31.95	$27.95
D-40	40,15	66	28.95	24.95
D-20	20	33	27.95	23.95
D-15	15	22	26.95	22.95
D-10	10	16	25.95	21.95
Shortened dipoles				
SD-80	80,75	90	35.95	31.95
SD-40	40	45	32.95	28.95
Parallel dipoles				
PD-8010	80,40,20,10,15	130	43.95	39.95
PD-4010	40,20,10,15	66	37.95	33.95
PD-8040	80,40,15	130	39.95	35.95
PD-4020	40,20,15	66	33.95	29.95
Dipole shorteners - only, same as included in SD models				
S-80	80,75		$11.95 pr	
S-40	40		$10.95 pr	

All antennas are complete with a HI-Q Balun or HI-Q Antenna Center insulator, No. 14 antenna wire, ceramic insulators, 100 nylon antenna support rope (SD models only 50) rated for full legal power. Antennas may be used as an inverted V and may also be used by MARS or SWLs.

Antenna accessories—available with antenna orders

Nylon guy rope 450# test 100 feet	$4.49
Ceramic (Dogbone Type) antenna insulators	$1.50 pr
SO-239 coax connectors	.55

All prices are postpaid USA 48
Available at your favorite dealer or order direct from

Van Gorden Engineering Dealer Inquiries Invited

BOX 21305 B, SOUTH EUCLID, OHIO 44121

NEW TS830S for $150?

Yes indeed! Just add a Matched Pair of top-quality 2.1KHz BW (bandwidth) Fox Tango Filters. Here are a few quotes from users:

"... Makes a new rig out of my old TS830S! ..."
"...VBT now works the way I dreamed it should..."
"...Spectacular improvement in SSB selectivity..."
"...Completely eliminates my need for a CW filter..."
"...Simple installation - excellent instructions..."

The Fox Tango filters are notably superior to both original 2.7KHz BW units but especially the modest ceramic 2nd IF; our substitutes are 8-pole discrete-crystal construction. The comparative FT vs Kenwood results? VBT OFF — RX BW: 2.0 vs 2.4; Shape Factor: 1.19 vs 1.34; 80dB BW: 2.48 vs 3.41; Ultimate Rejection: 110dB vs 80. VBT SET FOR CW at 300Hz BW — SF 2.9 vs 3.33; Insertion Loss: 1dB vs 10dB.

AND NOW A NEW TS 930S!
Tests prove that the same filters improve the '930 even more than our '830. Don't buy CW filters—not even ours. You probably won't need them!

INTRODUCTORY PRICE: (Complete Kit)...$150
Includes Matched Pair of Fox Tango Filters, all needed cables, parts, detailed instructions. Specify kit desired: FTK-830 or FTK-930.
Shipping $3 (Air $5). FL Sales Tax 5%

ONE YEAR WARRANTY
GO FOX-TANGO - TO BE *SURE!*
Order by Mail or Telephone.
AUTHORIZED EUROPEAN AGENTS
Scandinavia MICROTEC (Norway)
Other: INGOIMPEX (West Germany)

FOX TANGO CORPORATION
Box 15944S, W. Palm Beach, FL 33406
Phone: (305) 683-9587 ✓323

1982-1983
AMATEUR RADIO *CALL DIRECTORY*©

THE BARGAIN AT **$14.95** Plus Shipping

A no frills directory of over 411,000 U.S. Radio Amateurs. 8½x11, easy to read format. Completely updated.

Also available for the first time ever—
(Alphabetically arranged—Sold separately)
Geographical Index
by State, City and Street No. and Call
Name Index
by Name and Call

Ordering Information:
- **Directory—$14.95**
- **Geographical Index—$25.00**
- **Name Index—$25.00**

Add $3.00 Shipping to all orders.

Dealers/Clubs inquiries welcome
Send your order—enclosing check or money order in U.S. dollars to:

Buckmaster Publishing
70-J Florida Hill Road
Ridgefield, CT 06877 U.S.A. ✓226

← *Reader Service for facing page ✓5*

John Lawson W3ZC
701 Concord Way
Hatfield PA 19440

No-Crash Autopatch

Dialing and driving don't mix. Build this autodialer and let its fingers do the walking—not yours.

Have you ever wanted to make an autopatch call through your local repeater and were afraid to take your hands off the wheel or your eyes from the road and didn't want to stop? Well, I have. And after one particularly foolish and scary experience, I decided to do something about it.

In analyzing my needs, I realized that the only number that I would call via autopatch would be my home phone number. This greatly simplified my thinking. The circuit had to be automatic, easily activated, and small enough to fit inside my rig. My usual mobile station is a Heath 2036A with touchtone™ capabilities that works fine. I have used it several times to call home very successfully. But with my family of drivers, sometimes my mobile station is visiting the hairdresser or the shopping mall and I am left with the cantankerous clunker. I know I should remove the rig whenever I leave the car, but that grows tiresome. When I must use the clunker, I take along my "kitchen rig," a single-channel, homebrewed, plain-vanilla, no-frills thing. In these days of fully-synthesized, scanning, computerized transceivers, my kitchen rig is nothing to brag about. But it was my first experience on FM, and it was built to see if two-meter FM was my bag before investing lots of bucks in a better rig. I probably will always have it so I decided to add the automatically-dialed autopatch feature inside.

Photo A. Front-panel mounting of switches and LED.

The kitchen rig is not what you would call miniature, but there isn't an awful lot of room inside. Ten C-sized nicad batteries take up a lot of space. Therefore, the addition of autopatch had to be small enough to fit into a corner and had to be easily operated. The circuit of Fig. 1 evolved.

Circuit Description

The heart of the circuit is the 8223, U5, a 32×8 programmable read only memory, or PROM. This IC, in effect, replaces the touchtone pad used in normal autopatch applications. The memory inside the PROM must be programmed before being used in any circuit. This circuit is no exception. A detailed description of the PROM programming that I used in the dialer will be discussed later in the article.

Basically, the PROM is separated into three memory segments. One is used for access, one for the phone number, and one for clearing. If programmed and addressed properly, the PROM sequentially drives the 14410 encoder chip, U6, to automatically produce the tones for accessing the patch, dialing the number, and clearing the patch. The PROM is addressed by U4, a 74393 dual four-bit binary

counter. The counters are cascaded because five binary bits are required to address all 32 words in the PROM. A sixth bit drives the end-of-message gate and the remaining two bits are unused. U3 is configured as a free running clock and controls the system timing by stepping the counter through the clock gate, U2A. A pot is used to set the timing.

U1A and U1B are connected as a set-reset flip-flop. This flop is used as the start/stop element by opening or closing the clock gate, U2A. Power-on reset is achieved via the RC network connected to pin 5 of U1B. The flip-flop is set by the ACCESS push-button which starts the operation and is reset by the CLEAR push-button or by the end-of-message gate, U2B. U2B becomes active at count 32 of the counter. I have found that this memory size is more than adequate for the dialer. If you decide to shorten the dialing cycle to less than 32 words, you can use the two inputs tied to Vcc on U2B to perform the logic. The reset, or abort circuitry, consists of gates U1D, U2C, the three germanium diodes, and the CLEAR push-button. Germanium diodes are used because of their low forward voltage drop.

A three-terminal regulator provides the five volts required for IC operation from the 12-volt line in the transceiver. Liberal use of bypass capacitors on the five-volt line is an absolute must. Digital logic and rf are like oil and water—they don't mix too well.

Because my rig is battery powered, I have included a separate switch to remove power when it is not in use. Also, Q1 is used in the Vcc line of the PROM to save about 20 mA of battery current when the circuit is in standby. External connections are made to the transceiver 12-volt line, ground, and the microphone input line. An output pot adjusts the signal level to the transceiver mike amplifier stage.

The PROM

A PROM has the ability to internally store information in the form of ones and zeros as defined by the user. The 8223, U5, is organized as 32 words by eight bits per word. This simply means that there are 32 combinations of the eight outputs. A PROM differs from a random access memory, or RAM, in that a user can write differing combinations of ones and zeros into a RAM and can change them at will. Of course, this means that you will need additional circuitry to perform the write cycle. If the desired program is fixed and will not change, then a PROM is a better choice. You will not need the additional circuitry, but you had better make sure your program is right the first time or you have lost a PROM. You can change PROMs but you can't change what's inside. You must decide at the onset what program will be "fused," or "burned."

A problem that the builder may encounter is how to go about getting his PROM

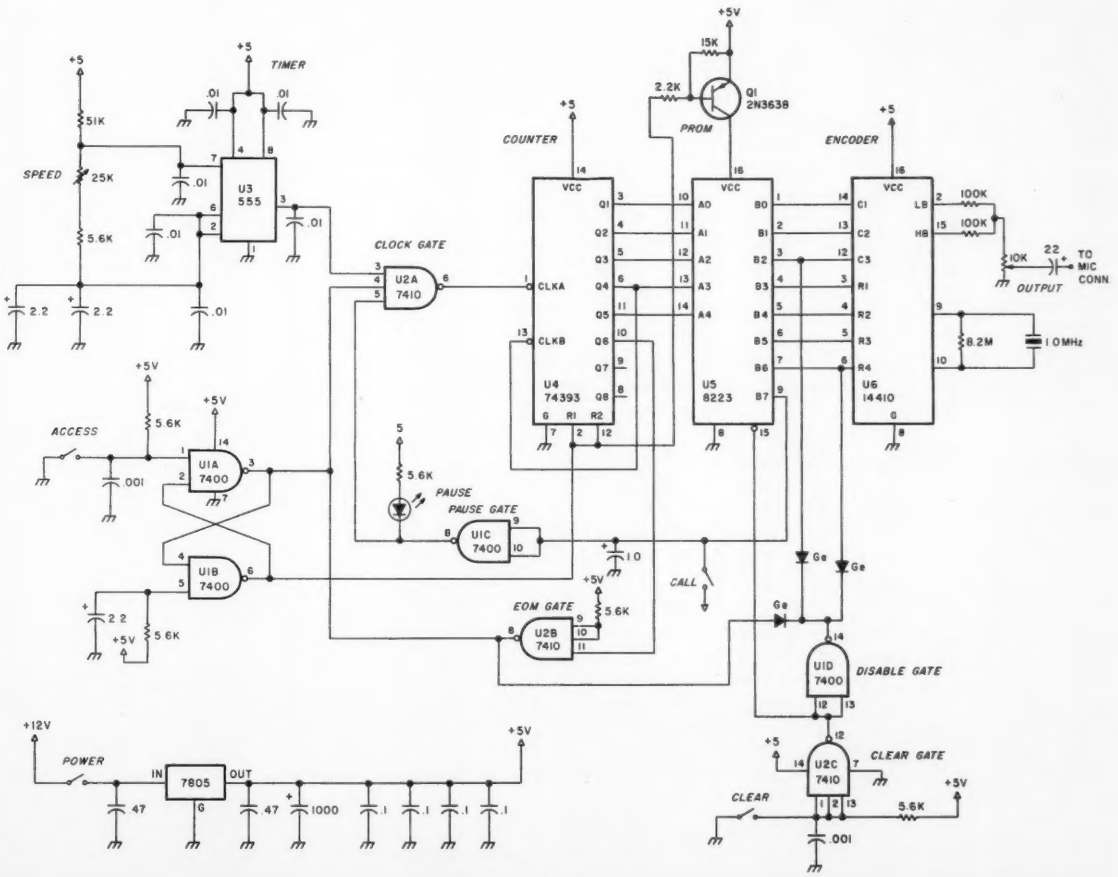


Fig. 1. Schematic of automatic dialer. All resistors ¼ W. All capacitors in µF. All pots screwdriver adjustable.

burned. Since I am employed in electronics, I never had this problem. There was always a PROM burner available. But all too often a writer makes the wrong assumption that everything is available to everyone. However, all is not lost. There are many hams who work in electronics and perhaps one of these fellows could help you out. Ask around. It doesn't take very long to burn a PROM with modern industrial equipment, so your obligation won't be that far-reaching. If all else fails, then you can always take the rough road and breadboard yourself a programmer. I refer you to the article by WB2CZL entitled "An 82S23 PROM Programmer" (*73 Magazine*, June, 1977).

Once a programming source has been located, you must decide what to program. The PROM output lines feed a standard encoder chip, U6. The 14410 requires only seven inputs, so that leaves one PROM line free. This line is used as a control bit to perform the pause function between access and call, and call and disable. Refer to Fig. 2 for the programming required to produce the desired tones. I recommend that you write out the entire program map as I have done in Fig. 3. PROMs of this type come supplied with zeros in every location and you need only be concerned about which bits of which word should be burned to ones. However, seeing the entire bit pattern will make it easier to ensure that your bit pattern is burned correctly the first time.

Desired Tone	PROM Outputs Required to be Low
1	B0 and B3
2	B1 and B3
3	B2 and B3
4	B0 and B4
5	B1 and B4
6	B2 and B4
7	B0 and B5
8	B1 and B5
9	B2 and B5
*	B0 and B6
0	B1 and B6
#	B2 and B6

Fig. 2. PROM programming necessary to produce the desired tones. Create a chart as I did in Fig. 3. Word 00 must be as I have defined it. Select the tones you want and refer to the above figure to determine where the zeros must go. Everything else is ones except for B7. Insert a one at B7 where you want a pause. Start at word 01 and fill in the ones and zeros. The tones will be sent in the sequence that you have defined them on the chart.

Notice in Fig. 3 that B7 is at a high twice in the sequence. This causes two pauses in the dialing program. Thus, the program is divided into three segments. The first segment is used to access the patch. Our local repeater requires three tones for access and, in my program, six words of memory. Word 00 causes no tones to be produced and is used as the rest state. Inactive states are also placed between the desired tones to separate similar consecutive dial tones. If your access code on your repeater requires two tones instead of three, program words 01 and 02 for the first tone and 04 and 05 for the second. Circuit capacitance and speed are such that each tone spread over two words will sound as one continuous tone at the output. Should a single tone access be required, program words 01 through 05 for that tone. On the air it will come through uninterrupted. Word 06 contains a high on B7. This stops the sequence and causes the LED to light. A lighted LED indicates that the access tones have been sent.

The second segment of the program contains the information necessary to produce the tones for the telephone number. Notice again the inactive words between the desired tones. Should your phone number require a 1 in front of the seven digits, you will need a larger second segment. Instead of programming B7 for a one at word 21, leave it at zero. Make B7 a one at word 23 and you will have enough room to incorporate the eight digits. A pause should always be followed by an inactive state to allow things to settle before the program continues.

The third segment of the program is used to disable the patch. In my case it required a single tone. As many as three tones can be inserted in the disabling segment. Do not plan to use any words beyond word 31 because you will be out of memory and the sequence will loop back to the beginning until a high at B7 is encountered. As stated earlier, you can use the entire 32 words of memory.

A comment about word numbering: Word 00 counts as a word in memory-logic descriptions. Therefore, word 31 is in reality the 32nd word in the sequence. The same is true of bit numbering. Bit 0, or B0, is the first bit in the output scheme. B7 therefore is the eighth bit. Don't blame me. It's what is known as convention.

The circuit consisting of U1D, U2C, the CLEAR push-button, and the three germanium diodes is designed for a single-tone disable. If your repeater requires more than one tone to disable the patch, this circuit is of no

PROM Address	PROM Output Lines B0	B1	B2	B3	B4	B5	B6	B7	Tone Sent
Word 00	1	1	1	1	1	1	1	0	-
Word 01	0	1	1	1	1	1	0	0	*
Word 02	1	1	1	1	1	1	1	0	-
Word 03	1	0	1	1	0	1	1	0	5
Word 04	1	1	1	1	1	1	1	0	-
Word 05	1	1	0	1	0	1	1	0	6
Word 06	1	1	1	1	1	1	1	1	Pause
Word 07	1	1	1	1	1	1	1	0	-
Word 08	1	0	1	1	1	0	1	0	8
Word 09	1	1	1	1	1	1	1	0	-
Word 10	1	0	1	0	1	1	1	0	2
Word 11	1	1	1	1	1	1	1	0	-
Word 12	1	0	1	0	1	1	1	0	2
Word 13	1	1	1	1	1	1	1	0	-
Word 14	1	0	1	1	1	0	1	0	8
Word 15	1	1	1	1	1	1	1	0	-
Word 16	1	0	1	1	1	0	1	0	8
Word 17	1	1	1	1	1	1	1	0	-
Word 18	0	1	1	1	0	1	1	0	4
Word 19	1	1	1	1	1	1	1	0	-
Word 20	1	0	1	1	1	0	1	0	8
Word 21	1	1	1	1	1	1	1	1	Pause
Word 22	1	1	1	1	1	1	1	0	-
Word 23	1	1	0	1	1	1	0	0	#
Word 24	1	1	0	1	1	1	0	0	#
Word 25	1	1	0	1	1	1	0	0	#
Word 26	1	1	0	1	1	1	0	0	#
Word 27	1	1	0	1	1	1	0	0	#
Word 28	1	1	0	1	1	1	0	0	#
Word 29	1	1	0	1	1	1	0	0	#
Word 30	1	1	0	1	1	1	0	0	#
Word 31	1	1	0	1	1	1	0	0	#

*Fig. 3. PROM programming used at W3ZC to access patch, dial number, and disable the patch. Access code is * 5 6, my home phone number is 8 2 2 8 8 4 8, and a # series is used to disable. A high at B7 produces a pause at the end of the access tones and at the end of the phone number. The CALL or CLEAR push-buttons override the pause.*

The Interface

Software Available for Six Computers

The versatility of the personal computer gives you a whole new world with the Kantronics Interface™ and Hamsoft™ or Hamtext™. The Interface™ connects to any of six popular computers with Hamsoft™ or Hamtext™ giving you the ability to send and receive CW/RTTY/ASCII. An active filter and ten segment LED bargraph make tuning fast and easy. All programs, except Apple, are on program boards that plug directly into the computer.

Hamtext™, our new program, is available for the VIC-20 and Commodore 64, with all the features of Hamsoft™ plus the ability to save received information to disc or tape, variable buffer sizes, VIC printer compatibility, and much more. Our combination of hardware and software gives you the system you want, with computer versatility, at a reasonable price.

Hamsoft™ Features

Split Screen Display
1026 Character Type Ahead Buffer
10 Message Ports-255 Characters each
Status Display
CW-ID from Keyboard
Centronics Type Printer Compatibility
CW send/receive 5-99 WPM
RTTY send/receive 60, 67, 75, 100 WPM
ASCII send/receive 110, 300 Baud

Hamsoft™ Prices

Apple Diskette	$29.00
Atari Board	$49.95
VIC-20 Board	$49.95
TRS-80C Board	$59.95
TI-99 Board	$99.95

Hamtext™ Prices

VIC-20 Board	$99.95
Commodore 64 Board	$99.95

Suggested Retail $169.95

For more information contact your local Kantronics Dealer or:
Kantronics 1202 E. 23rd Street Lawrence, KS 66044

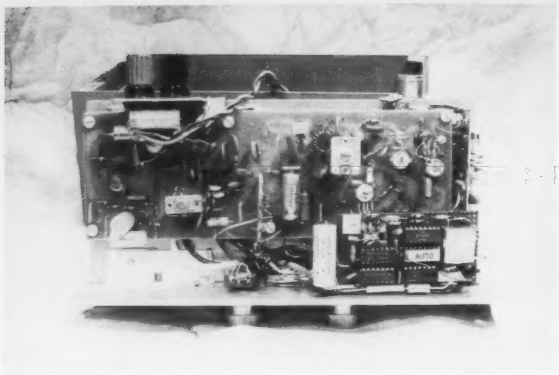


Photo B. The position of the automatic-dialer board inside the transceiver. The board is at the lower right.

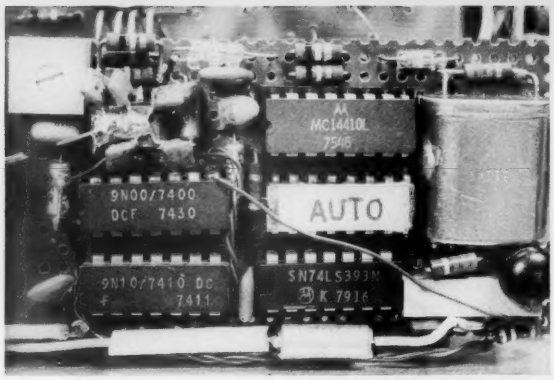


Photo C. ICs are mounted in sockets and pots are PC type. The crystal is at the right and Q1 is mounted between the crystal and the output pot. The speed pot is at the upper left. The 555 assembly is next to the speed pot and is described in the text. The PROM is under the AUTO stick-on label.

use to you. Eliminate it and ground pin 15 of U5 directly. The program must then be used to perform the disabling function. This CLEAR circuitry was incorporated to abort everything should a malfunction occur anywhere in the entire sequence.

Construction

The six ICs and associated components are mounted on a 1½" × 2½" piece of perforated circuit board. Point-to-point wiring is used throughout. Shielded cable should be used at the output. Keep in mind that there may be a lot of rf floating around inside the cabinet, a situation that I encountered during checkout. I instinctively tried a shield over the top of the board. It didn't cure the problem, but it looked like a good idea to retain it. You might want to try yours without it at first.

Notice in the photo the unusual arrangement around the 555 timer. Rf made this chip go wild. The solution was to strip some copper foil from a piece of printed circuit board material, cut it to the size of the 555, place it on top of the chip, and wire it to pin 1 of the chip itself. Bypass every pin on the 555 with a .01-uF capacitor. Don't leave your iron on the IC pins too long. You don't want to ruin the chip. I used sockets for my ICs and if you do, you'll have to wait until you are ready to insert the ICs before shielding the 555. Don't try it on the bench. Solder may run down the leads and you'll never get the chip into the socket. Your installation may not require these extremes, but if your timer is also affected by rf, the solution presented here should work.

An appropriate spot must be found to mount the 7805 three-terminal five-volt regulator. A single hole is required somewhere on the chassis. I used heat-sink compound on the regulator but, in retrospect, it's probably not required. The circuit draws a little over 60 mA and the 7805 should take it without the compound. Just make sure that the mounting surface is flat.

I mounted the three form A push-buttons, the LED, and the toggle switch on the front panel. Bypass the switch contacts right at the switch.

The whole circuit could be built into an external box if you don't mind carrying around another piece. Interconnections would be Vcc, ground, and a shielded audio cable. This arrangement also might alleviate the rf pickup problems.

Operation

The operation of the automatic dialer is described in the following steps:

1. Turn on the toggle switch to power the unit.
2. Depress the mike button and announce your intentions.
3. Still holding the mike button down, push the ACCESS push-button. This produces the tones required to raise the patch.
4. When the LED comes on, release the mike button to determine if you were successful in accessing the patch. If you were, you should hear the dial tone. If you don't hear a dial tone, push the mike button and abort the procedure by depressing the CLEAR push-button and try again.
5. When you hear the dial tone, push the mike button and depress the CALL push-button. When the number has been automatically dialed, the LED will come on again. Release the mike push-button.
6. If you hear nothing but empty air, or if Ma Bell blisters you with one of the taped messages, abort and give it another try. If the ringing is heard, then abide by the customs and procedures appropriate with your repeater. On mine, you announce your callsign and the telephone exchange.
7. When the phone is answered, indicate that the conversation is going out on the air. Complete the call.
8. To knock the patch down, depress the mike button and the CALL or the CLEAR push-button.
9. Turn the toggle switch off.

The CLEAR push-button can be used at any time in the procedure to cancel the whole cycle.

Adjustment

Adjustment of the circuit is easiest if an oscilloscope is available. Double check your wiring before turning on the power. Remember that ICs are totally unforgiving if you have made a mistake.

Turn on the power-on toggle switch and depress the CLEAR push-button. Check pin 3 of U3 for oscillation. Do not turn on the transmitter at this time. You should see pulses of several hundred milliseconds in duration. You should be able to see a speed change when varying the speed pot. Usually in the whole auto-patch cycle, the limiting factor as far as speed is concerned is the response time required by the repeater to access. The telephone lines will accept tone durations as short as 70 milliseconds. Rarely will you find a repeater that will respond to

ICOM - Check the Big Savings at AES!

HF Transceivers:	Regular	SALE
IC-720A 9-band Xcvr/.1-30 MHz Rcvr	$1349.00	1099
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 KHz AM filter	49.50	
MB-5 Mobile mount	19.50	

IC-740 • $50 REBATE
Low AES Price + $$ back from ICOM
Hurry! - offer ends March 31st, 1983

	Regular	SALE
IC-740 9-band 200w PEP Xcvr	$1099.00	949.95
EX-238 Internal power supply	159.00	149.95
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-44 455 KHz SSB filter	159.00	129.95
FL-45 9 MHz 500 Hz CW filter	59.50	
FL-54 9 MHz 270 Hz CW filter	47.50	
FL-52 455 KHz 500 Hz CW filter	96.50	89.95
FL-53 455 KHz 250 Hz CW filter	96.50	89.95
EX-254 Mobile mount	TBA	
HM-10 Mobile scan microphone	39.50	

	Regular	SALE
IC-730 8-band 200w PEP Xcvr w/mic	$829.00	649.95
FL-30 SSB filter (passband tuning)	59.50	
FL-44 455 KHz SSB filter	159.00	129.95
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
HM-10 Mobile scan microphone	39.50	

Common accessories - 720/740/730	Regular	SALE
PS-15 External 20A power supply	$149.00	134.95
EX-144 Adaptor; CF-1/PS-15	6.50	
CF-1 Cooling fan for PS-15	45.00	
PS-20 20A switching ps w/speaker	229.00	199.95
CC-1 Adaptor; HF radio to PS-20	10.00	
CF-1 Cooling fan for PS-20	45.00	
SM-5 8-pin electret desk mic	39.00	
SP-3 External speaker	49.50	
Speaker/phone patch (specify radio)	139.00	129.95
AT-100 100w 8-band automatic ant tuner	349.00	314.95
AT-500 500w 9-band automatic ant tuner	449.00	399.95
AH-1 5-band mobile ant w/tuner	289.00	259.95

HF Linear Amplifier	Regular	SALE
IC-2KL 160-15m/WARC solid state linear	1795.00	1299

VHF/UHF Multi-modes:	Regular	SALE
IC-251A 2m FM/SSB/CW Xcvr/AC ps	$749.00	599.95
IC-551D 80w 6m Xcvr	699.00	599.95
PS-20 20A switching ps/spkr	229.00	199.95
CF-1 Cooling fan for PS-20	45.00	
EX-106 FM adaptor	125.00	112.95
IC-451A 430-440 SSB/FM/CW Xcvr/ps	899.00	769.95
IC-451A/High 440-450 MHz Xcvr/ps	899.00	769.95
AG-1 15 db preamp for IC-451A	89.00	79.95
IC-290H 25w 2m SSB/FM Xcvr, TTP mic	549.00	489.95
IC-560 10w 6m SSB/FM/CW Xcvr	489.00	439.95
IC-490A 10w 430-440 SSB/FM/CW Xcvr	649.00	579.95

VHF/UHF FM:	Regular	SALE
IC-25A 2m xcvr 1982 model, red LEDs	$349.00	289.95
IC-25A 1983, 25w/green LEDs/HM-14	359.00	319.95
IC-25H as above, but 45 watts	389.00	349.95
IC-45A 10w 440 FM, TTP mic	399.00	359.95
EX-270 CTCSS encoder for IC-45A	TBA	
IC-22U 10w 2m FM non-digital Xcvr	$299.00	249.95
EX-199 Remote frequency selector	35.00	

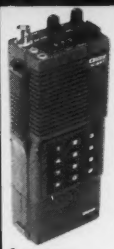
VHF/UHF Portables:	Regular	SALE
IC-202S 2m port. SSB Xcvr, 3w PEP	$279.00	249.95
IC-505 3/10w 6m port. SSB/CW Xcvr	449.00	399.95
BP-10 Internal nicad battery pack	79.50	
BC-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
IC-402 432 port. SSB Xcvr, 3w PEP	389.00	349.95

Amplifiers for portables:	Regular	SALE
IC-20L 2m amp, 10w PEP or FM	98.00	89.95
IC-30L 432 amp, 10w PEP/FM	105.00	94.95

Shortwave receiver:	Regular	SALE
R-70 100KHz-30MHz digital receiver	$749.00	649.95
EX-257 FM unit	TBA	
EX-261 Transceive interface; 720A	TBA	
FL-44 455 KHz SSB filter	159.00	129.95
FL-63 9 MHz 250 Hz CW filter	TBA	
SP-3 External speaker	49.50	

AES STORE HOURS
Mon. thru Fri. 9-5:30; Sat. 9-3

E-X-P-A-N-D-E-D WATS HOURS
Milwaukee **WATS** line **1-800-558-0411** answered evenings until 8:00 pm, Monday thru Thursday.
Please use WATS line for Placing Orders.
For other information, etc. please use Regular line.



ICOM Handhelds
The Transceivers. The IC-2A features full coverage of the 2 meter ham band. The IC-3A covers 220 to 224.99 Mhz, and the IC-4A, 440 to 449.995 Mhz. Each comes with BP-3 rechargable battery, AC wall charger, flex antenna, earphone, wrist strap, and belt clip. Accessories are interchangable. Slide on, removable battery pack allows quick change and may be charged while removed from transceiver.

2 meters:	Regular	SALE
IC-2A .15/1.5w 2m HT/batt/wall cgr	$239.50	214.95
IC-2AT .15/1.5w 2m HT/batt/cgr/TTP	269.50	219.95

220 MHz:		
IC-3A 220 HT/batt/wall cgr	269.95	229.95
IC-3AT .15/1.5w 220 HT/batt/cgr/TTP	299.95	239.95

440 MHz:		
IC-4A .15/1.5w 440 HT/batt/wall cgr	269.95	229.95
IC-4AT .15/1.5w 440 HT/batt/cgr/TTP	299.95	239.95

Hand-held Accessories:	Regular
BC-25U Extra 15-hour wall charger	$10.00
BC-30 1/15-hour drop-in charger for BP-2/3/5	69.00
BP-2* 450 ma, 7.2v 1w extended time battery	39.50
BP-3 Extra standard 250ma 8.4v 1.5w battery	29.50
BP-4 Alkaline battery case	12.50
BP-5* 450 ma, 10.8v 2.3w high power battery	49.50
*BC-30 required to charge BP-2 & BP-5	
FA-2 Extra 2m flexible antenna	10.00
CA-2 Telescoping ¼-wave 2m antenna	10.00
CA-5 ⅝-wave telescoping 2m antenna	18.95
CA-3 Extra 220 flexible antenna	9.12
CA-4 Extra 440 flexible antenna	9.12
CP-1 Cigarette lighter receptacle charger for BP-3	9.50
DC-1 DC operation module	17.50
HM-9 Speaker/microphone	34.50
LC-2A Leather case without TTP cutout	34.95
LC-2AT Leather case with TTP cutout	34.95
ML-1 2m 2.3/10w HT amplifier (Reg. $89)	SALE 79.95

Marine band:
IC-M12 12 ch Marine hand-held **SPECIAL $199.95**

Misc. accessories:	Regular
24-PP 24-pin accessory plug	$ 4.00
BC-10A Memory back-up; 551/720/730/740	8.50
BC-20 Nicads & DC-DC charger for portables	57.50
BU-1 Memory back-up; 25A/290A/490A	38.75
EX-2 Relay box w/marker; 720A/730/701	34.00
HM-3 Deluxe mobile microphone (specify radio)	17.50
HM-5 Noise canx mobile microphone, 4 pin	34.50
HM-7 Amplified mobile microphone, 8 pin	29.00
HM-8 Touch-tone mic; 255A/260A, 8 pin	49.95
HM-10 Scan mic.; 255A/260A/290A/25A	39.50
HP-1 Headphones	34.50
IC-3PS Power supply for ports. (Reg $95)	SALE 89.95
SM-2 4-pin electret desk microphone; 551D	39.00
SM-5 pin electret desk mic.; 251A/451A	39.00
SP-4 Remote speaker for portables	24.95
Speaker/phone patch, specify (Reg. $139)	SALE 129.95

MasterCard VISA

Order Toll Free: 1-800-558-0411
In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 - Phone (414) 442-4200

AES BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 33575
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

Associate Store
CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside Illinois 1-800-621-5802

autopatch access commands in a period that short. You'd best start out at a period no faster than 300 milliseconds.

Move your scope probe to pin 6 of U2 and depress the ACCESS push-button. You should see the clock pulses as they pass through the clock gate. Keep your probe on pin 6, U2. At the end of the access count, the pulses should stop and the LED should come on. Reset the circuit and trace the pulses (after restarting) through the counter and the PROM. Check the top of the output pot with the scope. When the circuit is running, you should see two superimposed sine waves representing the required tones for a dialed digit.

If you don't have a scope, you can use your 20,000-Ohms-per-volt voltmeter. Read the voltage at the output of the 555. The reading should be greater than zero and less than five volts. Move the positive lead of your voltmeter to pin 6 of U2 and press the ACCESS push-button. You should read essentially the same voltage as you did at the clock output until the LED comes on. At that time the reading should be zero. Put your voltmeter on ac and move it to the top of the output pot. Push the CALL push-button and you should notice a reading on your meter. This is a high impedance point so the reading will most likely be small. If you don't get a reading, move your voltmeter to pin 2 of U6 and try again. This point is lower impedance. If you still don't get a reading, you will have to trace the pulses through the counter and PROM. Pin 3 of U4 will change states with every pulse, so you should notice something there. As far as the PROM is concerned, pick the output from your PROM map that changes most frequently and look at that particular pin. Checkout of the gates should be straightforward. A high should be read at the output of U1C when tones are being produced, and a low when the sequence is completed. At the output of U2B you should see a high after you depress the ACCESS push-button. It should go low at the end of the entire cycle or when the CLEAR push-button is pressed. By this time, you should be fairly confident that the circuit operates, and you are ready for an on-the-air test.

Enlist the aid of another ham and, if you can, go to a simplex frequency or to a repeater without a patch. Run through your sequence and adjust the output pot as required to produce clear tones. Make sure your companion is as objective as possible. Once the output is adjusted properly, you can give it the acid test on the repeater. If you can't go to a simplex frequency, you'll have to do your testing on the autopatch repeater. Pick a time when it is not busy and give it a try. You may have to adjust the timing to be compatible with the repeater access response. The repeater control op should be able to help you if the tone timing needs lengthening.

Conclusion

If you follow the circuit diagram carefully and play by the rules, your automatic dialer will be a useful addition to your amateur gear. I am also sure that there is room for improvement. Ask yourself what you really want out of the unit and sit down with an IC spec book, pencil, and paper. You will find that your understanding of digital circuitry will improve, and the mistakes and successes of your changes will help you to debug other circuits that you may encounter in the future. ■

80M IN 24 FT!

Put a broad bandwidth 80M dipole in 24 ft with the SLINKY DIPOLE® antenna. Comparable low SWR, space savings and performance on ALL HF bands, including SWL and WARC. Complete kit: 2 special 4" coils, 50' RG-58/U coax, balun kit, mounting hardware and instructions. Great for apartments, condominiums, motels and vacation use. Easy set up and adjustment.

Ask for **FREE** antenna comparison sheet

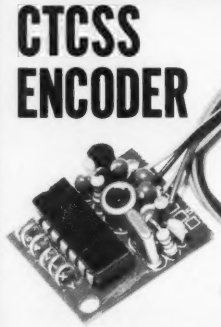
Blacksburg Group
Box 242 Suite 500
Blacksburg, Virginia 24060
703/951-9030

$67.95 postpaid (in USA)
Money Back Guarantee
Virginia Residents add 4% sales tax

See us in Dayton!

PROGRAMMABLE CTCSS ENCODER

$26.95



- All 37 EIA Tones
- Quartz Accurate
- Less than 1 inch square

AVAILABLE FOR IMMEDIATE DELIVERY

For more information call TOLL-FREE
(800) 828-6884
NY: (800) 462-7242
CANADA: (416) 884-3180
218

FERRITRONICS
MOBILE DATA SYSTEMS
1319 PINE AVE.
NIAGARA FALLS NY 14301
(716) 282-7470 TLX 06-966680

RECEIVE WEATHER CHARTS IN YOUR HOME!

You can DX and receive weather charts from around the world.

Tune in on free, worldwide government weather services. Some transmitting sites even send weather satellite cloud cover pictures!

You've heard those curious facsimile sounds while tuning through the bands—now capture these signals on paper!

Assemble ALDEN's new radiofacsimile Weather Chart Recorder Kit, hook it up to a stable HF general-coverage receiver, and you're on your way to enjoying a new hobby activity with many practical applications. Amateurs, pilots, and educators can now receive the same graphic printouts of high-quality, detailed weather charts and oceanographic data used by commercial and government personnel.

Easy to assemble—Backed by the ALDEN name.

For over 40 years, ALDEN has led the way in the design and manufacture of the finest weather facsimile recording systems delivered to customers worldwide. This recorder kit includes pre-assembled and tested circuit boards and mechanical assemblies. All fit together in a durable, attractive case that adds the finishing professional touch.

Buy in kit form and save $1,000!

You do the final assembly. You save $1,000. Complete, easy-to-follow illustrated instructions for assembly, checkout, and operation. And ALDEN backs these kits with a one-year limited warranty on all parts.

Easy to order.

Only $995 for the complete ALDEN Weather Chart Recorder Kit. To order, fill out and mail the coupon below. For cash orders enclose a check or money order for $995. Add $5 for shipping and handling in the U.S. and Canada (for Massachusetts delivery, add $49.75 sales tax). To use your MasterCard or Visa by phone, call (617)366-8851.

ALDENELECTRONICS

Washington Street, Westborough, MA 01581 216

NAME:_____

CALLSIGN: _____

ADDRESS:_____

CITY:_____ STATE: _____ ZIP:_____

☐ I've enclosed a check or money order for $995.00 and $5.00 for shipping and handling, plus applicable sales tax.

☐ Charge to: ☐ MasterCard ☐ Visa

ACCOUNT # (ALL DIGITS)

EXPIRATION DATE

SIGNATURE REQUIRED IF USING CREDIT CARD _____

TU-170A

This single shift TU-170A is designed for standard RTTY communications and modern high-speed rates to 300 baud ASCII. Comes standard with crystal controlled AFSK, RS-232C and TTL compatible I/O for computers, 2125Hz and 2295Hz filters. Options include LO-tones, CW demodulator, and loop power supply for TTY machines.

$189.95 kit
$289.95 wired

TU-300

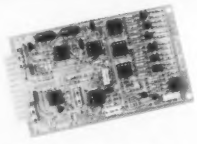
The TU-300 offers all of the features of the TU-170A and more with the capability of three shifts selectable on the front panel. The TU-300 comes standard with crystal controlled AFSK, 2125Hz, 2295Hz, 2550Hz, and 2975Hz filters. (LO-tones, CW demodulator and Loop supply optional.)

$289.95 kit
$399.95 wired

TU-170

This single shift TU-170 is compact, economical and ideal for HF or VHF applications up to 110 baud ASCII. Single board construction with AFSK and loop supply included. TTL compatible I/O, active filters and AFSK tuned for 2125Hz, 2295Hz.

$149.95
kit only



DM-170

The DM-170 demodulator is truly state-of-the-art, with active filters used throughout. The DM-170 includes anti-space circuitry, autostart output with adjustable threshold, scope outputs, meter output and loop keyer output. Requires additional ± 12VDC power supply.

$47.95
kit only

Call or write for our 1983 catalog with complete specifications and our full line of products and accessories. Dealer inquiries welcome.

Flesher Corporation
507 Jackson • P.O. Box 976 • Topeka, Kansas 66601
913-234-0198 • Telex 437125 ↙23

WORLD TIME WATCHES

the newest and best watches for hams from ACI

5 modes plus hourly chime

dual time shows GMT & local time

12/24 hour time

5 year lithium battery

ACI's new HAM-II's functions include local time, a second time zone for GMT, count-up and count down stopwatches, alarm, hourly chime, and high brightness backlight. The special tri-function display shows a two-alpha day of the week, digitial day-month, and six digit time in the main display. The second time zone display shows mode (T2), four digit local time and six digit GMT (or any other time zone). It's ideal for contests and logkeeping. The HAM-II, like its predecessor the HAM-I, it built rugged to last with a scratch resistant mineral glass crystal. The HAM-II case is polycarbonate, water resistant to 2.4 ATM, and the polyurethane band remains flexible even at very low temperatures.

4 modes plus hourly chime

independent analog/digital

12/24 hour time

ACI's HAM-III breaks the ana-digi price barrier with a rugged and functional, yet handsome watch for hams. It combines independently functioning analog and digital timepieces, both with quartz crystal accuracy. While the analog section is on local time, the digital section can display your choice of month-date-day, six digit time (ideal for GMT) with a 12/24 hour option, alarm time, or six digit chronograph. The HAM-III is built rugged with a scratch resistant crystal, die cast case, stainless steel band, and German time movement. The HAM-III is water resistant to 2.4 atm. It's available with a white face and stainless band, or goldtone face and stainless/goldtone band.

SPECIAL OFFER

buy a HAM-II and a HAM-III and get a 10% discount off the HAM-III

HAM-II ..... $22.95 HAM-III $49.95
HAM-III/stainless-gold $59.95
add $3.00 per order for shipping and handling. CA. residents ad 6½% sales tax. VISA, M/C accepted.

To order, call or write:
Advanced Communications Int'l
2411 Lincoln Avenue
Belmont, CA. 94002
↙448 **(415) 595-3949**

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.

Ham Radio's most popular antenna tuner. Improved, too.

$89.95 (+ $4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+ $4), like 941C less balun. **MFJ-945, $79.95** (+ $4), like 941C less antenna switch. **MFJ-944, $79.95** (+ $4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+ $4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER

MFJ-900

$49.95 (+ $4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load, SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$229.95 (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV

MFJ-984

$329.95 (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V

MFJ-989

$329.95 (+ $10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

To order or for your nearest dealer

CALL TOLL FREE 800-647-1800

For tech. info., order or repair status, or calls outside continental U.S. and inside Miss., call 601-323-5869.

- **All MFJ products unconditionally guaranteed for one year (except as noted).**
- **Products ordered from MFJ are returnable within 30 days for full refund (less shipping).**
- **Add shipping & handling charges in amounts shown in parentheses.**

Write for FREE catalog, over 80 products

MFJ ENTERPRISES, INCORPORATED

Box 494, Mississippi State, MS 39762

See List of Advertisers on page 114

Dr. Walter J. Atkins, Jr. K4AJQ
808 N. Smiley Street
O'Fallon IL 62269

Turn Mobile-Rig Whine into a Whimper

From brute-force filtering to solid-state regulation, K4AJQ has the answers to mobile noise.

If you've spent some time monitoring your local repeater, you should have noticed that some of the signals being relayed could stand some cleaning up. Many of these signals have hum or noise mixed with the audio. Often these are due to a malfunction in the transmitter or transceiver. Many times, however, the source can be traced to the power supply for the rig. Audio hum is fairly common for base stations. It often is caused by a lack of sufficient filter capacitance in the ac power supply or a defective regulator. The noise is usually not a hum in mobile rigs, but it has almost identical causes.

The noise present on mobile signals usually sounds like a whine and can easily be traced to the car's alternator. I have found that alternator whine is a commonly-encountered problem, and it is sometimes very difficult to suppress. Over the years, I have discovered several methods of dealing with this problem. One of them should work for you.

The Problem

The automobile alternator generates alternating current. Because the alternator is driven by the car's engine, the frequency of this alternating current depends upon engine speed. The pitch of alternator whine depends upon the frequency of the ac current. It is this ac that causes problems in most mobile rigs because they are designed to operate from pure direct current.

Before the alternator output can be used to power car systems, it first is converted to dc. This conversion, called rectification, is done by silicon diodes which usually are mounted right in the case of the alternator. The dc then is used to charge the car battery and to power the automotive systems.

Unfortunately, the output of the rectifiers is not pure dc. Because it is composed of rectified sine waves, it still possesses a characteristic frequency which can be related to engine speed. It is this frequency component which must be removed from the power line to the rig to prevent it from being transmitted along with the desired audio signal. The two methods I have used to do this are filtering and regulation.

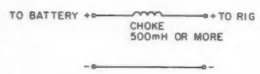


Fig. 1. Inductor used to suppress alternator whine.

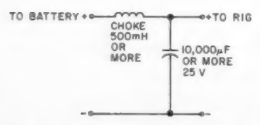


Fig. 2. Inductor-capacitor alternator-whine filter.

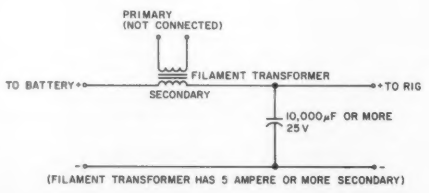


Fig. 3. Alternator-whine filter using filament transformer for inductor.

Filtering

A brute-force method of removing alternator whine is low-pass filtering of the power line. This can be done by using an inductor or an inductor-capacitor combination.

Fig. 1 shows the simplest whine-filtering circuit. You should use the largest value of inductance available. However, the resistance of the inductor must be low enough so that the voltage drop across it is not excessive. To find the maximum allowable voltage drop, you can connect your rig to a variable-voltage power supply and lower the voltage while transmitting until the power output into a

dummy load starts to fall off noticeably. Next, measure the car's battery voltage with the engine off. From these two measurements, you can calculate the maximum permissible inductor resistance.

With my rig, the power output started to fall off when the voltage was reduced to 12.2 volts. At this voltage, the current drawn was 5.4 Amperes. The car's battery voltage with the engine off was 13.6 volts. Therefore, the maximum permissible inductor resistance was $R=(13.6-12.2)/5.4$, which is 0.26 Ohms.

In Fig. 2, the filter contains both inductance and capacitance. I have found this circuit superior to the one in Fig. 1 and have used it many times. The added filtering provided by the large value of capacitance allows a smaller value of inductance to be used than would be necessary if only an inductor were used to provide the necessary filtering. When this circuit is used and the same inductor is used that was used in the circuit of Fig. 1, the filtering will be better than is possible with the inductor alone.

I have found that filter chokes (inductors) capable of carrying 3 Amperes or more are hard to find in the average ham's junk box. Over the years I've found them only in military surplus gear. A very good substitute is a filament transformer with a secondary winding capable of 5 Amperes or more. I have used 5-volt, 6.3-volt, and 12.6-volt filament transformers. These are plentiful in the junk boxes of us old-timers, who were around before the solid-state invasion. They are available also from many of the surplus dealers who advertise in *73*. Fig. 3 shows a whine filter using a filament transformer.

Regulation

Transistors are here to stay. I finally convinced myself of that and set out to see how those little devils worked. All of the inductor-capacitor whine filters I have built are big and heavy. This was no problem when gasoline was cheap and cars were large, but when I recently purchased an imported subcompact, I found my alternator filter wouldn't fit. In fact, it was almost as big as my engine. I immediately set out to solve the alternator-whine problem another way—using electronic regulation instead of brute force.

The circuit shown in Fig. 4 was developed experimentally. It completely removes alternator whine from the transmitted signal. I have tested this regulator circuit in three cars and found the performance the same in each. I have constructed the circuit using point-to-point wiring and using a PC board with the components mounted on the foil side. I used foil on the board for heat-sinking of the two MJE3055 power transistors in the printed circuit version. This has proven more than adequate for use with my mobile rig, which draws 1.5 Amperes on receive and 5.4 Amperes on transmit.

The components used in the regulator are not critical. Almost any NPN power transistors with adequate current-handling capability can be used instead of the MJE3055s.

Transistor Q2 and diodes D1 and D2 form what is known as an amplified zener diode. Essentially, it is a zener diode with the zener voltage the same as that of D1 and a power rating the same as that of Q2. I claim no originality for this circuit. It is old, and I no longer even remember where I first saw it. Fig. 5 further explains the amplified zener concept.

Conclusion

In this article, I have shared with you some ideas for ridding your signal of alternator whine. Some rigs are much more susceptible to whine than others. If your rig is one of those that could stand some cleaning up, get out the old soldering iron and have at it. Either the filtering method or the regulation method may be used. Both give excellent results. ■

NEW ELECTRONIC KITS
ALL IN ONE RTTY DEMODULATOR KIT
FEATURES -- ON BOARD POWER SUPPLY AFSK GENERATOR, PROVISIONS FOR LOOP SUPPLY, ACTIVE FILTERS OR OPTIONAL TORROID FILTER, AUTOSTART, ANTISPACE PCB KIT NO. 23-1770 SB-60 $169.95
RTTY SPEED CONVERTER
CONVERTS 60,75 & 100 WPM BAUDOT CODE TO 100 WPM CODE FOR BAUDOT MACHINES REVERSES SAME FOR SENDING. FEATURES SELCAL, BUFFERING AND INTERFACE FOR BAUDOT PTR. PCB KIT 23-1816 $89.95
BAUDOT/ASCII CONVERTER
MICRO BASED RTTY CONVERTER CONVERTS BAUDOT TO ASCII FOR RECEIVE, ASCII TO BAUDOT FOR TRANSMITTING. FEATURES SELCAL, BUFFERING AND INTERFACE FOR 110 BAUD PTR. PCB KIT 23-1815 $89.95
AUTO CW-ID KIT
FEATURES ON BOARD TEN MINUTE TIMER WITH TTL, PLUS/MINUS 12 INTERFACE AND UP TO 32 DOTS, DASHES OR SPACES. PCB KIT NO 23-1721 4-1/2X6 $29.95
ONE AMP POWER SUPPLY KITS
BELOW 3 KITS 22 EDGE CON 4-1/2X6
TU/LOOP SUPPLY PCB 23-1725 $27.95
+ 5 - 12V & +8 PCB 23-2125 $35.95
LOOP SUPPLY PCB 23-2025 $33.95
BELOW 2 KITS NOT ABOVE FORMAT
+ 5 - 12V & +8 2-1/2 X 5 FOR PLL TU
12 PIN EDGE CONN. PCB 23-1716 $29.95
+ OR -8 TO 24V (SPECIFY POLARITY AND VOLTAGE) PCB 23-0512 2X4 3/0 $14.95
RTTY DEMODULATORS
DM-60 ACTIVE OR OPTIONAL TORROID FILTER, AUTOSTART, ANTISPACE, SINGLE SHIFT (UP-DATED ST-6 ON ONE BOARD.) PCB KIT NO. 23-1712 $59.95
DM-30 PLL TU DESIGN WITH ACTIVE FILTER FRONT END. PCB 23-1719 $29.95
AFSK GENERATOR FOR RTTY
ROCK SOLID CRYSTAL CONTROLLED AFSK GENERATOR, VIRTUALLY DRIFT FREE. TWO POPULAR SIZES -- SPECIFY SIZE. PCB KIT NO. 23-1717 2-1/2X8 $29.95 PCB KIT NO. 23-1710 4-1/2X6 $31.95
TU BANDPASS FILTER ACTIVE FILTER AF60 PCB 23-1718 $ 9.95
TORROID FILTER BP60 PCB 23-1704 $12.95
LOGIC/GLITCH PROBE FREEZES HIGH SPEED PULSE OR LOGIC LVL PCB 23-1706 $15.95
RS232 LINE MONITOR MONITORS 9 COMMON RS232 LINES W/LED PCB 23-1707 $19.95
INTERFACE KIT OPTO/RS-232 XSTR LOOP TO TTL TTL TO LOOP PCB23-1722 $13.95
ONE KC SOURCE KIT PCB 23-1733 $ 3.95
AUDIO AMPLIFIER KIT PCB 23-1731 $ 3.95
TONE CONTROL RELAY PCB 23-1730 $ 3.95
PULSE GENERATOR KIT PCB 23-1732 $ 3.95
QUALITY LOW PRICED COMPONENTS
CABINETS
STOCK # W D H PRICE
03-5004 4.0 2.5 2.0 $5.53
03-5008 4.0 5.0 2.0 6.20
03-5012 4.0 6.0 3.0 7.99
03-5016 6.0 2.5 2.0 5.95
03-5020 5.0 7.5 2.5 8.79
03-5024 4.0 3.0 4.0 6.75
03-5028 8.0 3.5 2.5 7.65
03-5032 5.0 6.0 4.0 8.99
03-5036 4.0 3.0 6.0 7.47
03-5040 10.0 5.0 3.5 10.45
03-5044 5.0 5.0 7.5 11.49
UNIVERSAL CIRCUIT BOARDS
THREE SIZES AVAILABLE AS SHOWN FOR ONE IC 11-1700 $ .89
FOR 2 ICs NOT SHOWN 11-1702 $1.39
HORIZ. LAYOUT-UP TO 4 -40PIN ICs. 11-1703 $1.29
DRY TRANSFER DATAMARK SETS
DATAK
TV AND HI-FI 21-0058 $2.50
HAM RADIO & CB 21-0059 $2.50
EXPERIMENTER 21-0060 $2.50
TEST & INDSTRL 21-0061 $2.50
MARK & SWITCH 21-0062 $2.50
ALPH & NUMBERS 21-0063 $2.50
1/4 IN ALPHBET 21-0064 $2.50
1/2 IN ALPHBET 21-0065 $2.50
TITLES FOR ELECTRONIC EQUIP. 21-9501 - BLACK TITLES $9.95
METER DIAL KIT 21-0060 $9.95
DATAMARK SPRAY SEALER
GLOSS.....21-4177 $4.25
MATTE.....21-4178 $4.25
DONT MISS OUR 1983 CATALOG WITH OVER 1200 ITEMS. SEND $1.00 (REFUNDABLE ON FIRST ORDER) FOR OUR CATALOG, OR SEND A TEN STAMPS FOR OUR FREE FLYER
ALL KITS INCLUDE PARTS FOR PRINTED CIRCUIT BOARD ONLY.
PLEASE ADD $2.00 FOR SHIPPING. ADD .50 ADDITIONAL FOR UNDERS UNDER $5
CHECKS - MASTER CARD - VISA - COD
Daytapro Electronics, Inc.
3029 N. WILSHIRE LN., ARLINGTON HTS. ILL. 60004
312-870-0555
312

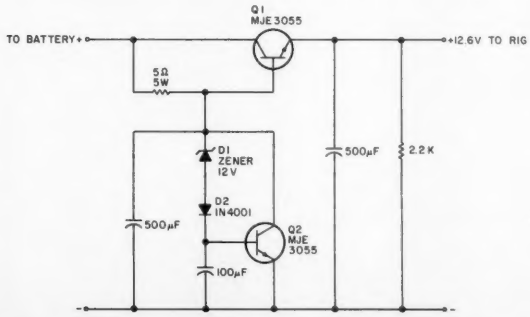


Fig. 4. Electronic regulator to remove alternator whine.

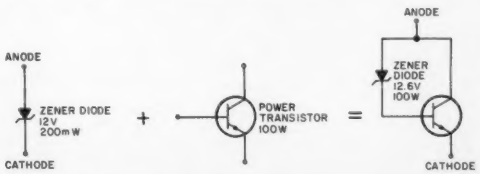


Fig. 5. The amplified zener diode.

See List of Advertisers on page 114

Mark Schmidt WB9EGA
524 S. 20th St.
Belleville IL 62221

Exploit the Hidden Interfaces of the TRS-80

Sound synthesis, a programmable timed on-off switch, and a CW keyer are all hidden in the TRS-80. You just have to look in the right place.

One day a friend was comparing his Apple II with my TRS-80, pointing out all its special features. Color graphics...that's nice. What do you mean, the TV is extra? High resolution graphics needs 16K just to hold the display! I guess I can live without color graphics. Built-in speaker...WOW! Now that's something I could use. As limited as the TRS-80 graphics are, sound would sure be a plus to some of the games. It would also come in handy to signal editing errors in programs. And how about a metronome accurate to 1/400 of a second? Too bad there isn't a cheap, easy-to-hook-up interface available. Ah-ha, but there is. And it won't cost you a cent; it's already built in. Didn't know that, did you? How do you think you CSAVE and PRINT#-1 data to the cassette recorder?

The only accessory you will need is an audio amplifier and speaker. What? You don't have an amp! I'll bet you do. What about that pocket radio you junked because the only way you could pick up a station was to stand under the transmitter's antenna. Well, the amplifier's still good. All you have to do is open it up and tap into the volume control. Assuming that most volume controls are generally wired the same, refer to Fig. 1 for hookup details. Note the 3 lugs on the volume control. Ignore the center lug. Remove the plug from the AUX jack on the cassette. Connect a wire from one outside lug of the volume control to the tip (inner conductor) of the plug. Connect another wire from the other outside lug to the ground on the plug. You might have to switch leads to get the loudest output.

If you find you may be using this newfound accessory quite often, you may want to rewire the earphone jack on the radio (no one uses it anyway). Then all you have to do is remove the plug from the AUX jack and insert it into the earphone jack on the radio.

If you really want to get fancy, there is plenty of room inside the video monitor for a home-brew amplifier and speaker.

Now to the meat—how to create the sound!

As you know, sound is made up of sine waves. But the closest thing to a sine wave that a computer can generate is a square wave. OK, so how do I make a square wave? The instruction we use is the OUT instruction to port number 255, using bits 0 and 1. Turning bit 0 on (OUT 255,1) creates the positive half of the cycle. Turning bit 1 on and resetting bit 0 (OUT 255,2) creates the negative half of the cycle (see Fig. 2). Generating 1 cycle won't give you much of a beep. That's where the FOR... NEXT loop comes in handy. Try the following:

```
1 DEFINT I-N
10 FOR I = 1 to 200
20 OUT 255,1
30 OUT 255,2
40 NEXT
```

Now we're getting somewhere. Changing the length of the loop will change the length of the beep. BASIC, being much slower than Assembler, will limit the range of tones you can generate. This example is the highest note you will be able to obtain using BASIC.

Any type of delay you might have between the positive and negative cycles will result in a lower frequency.

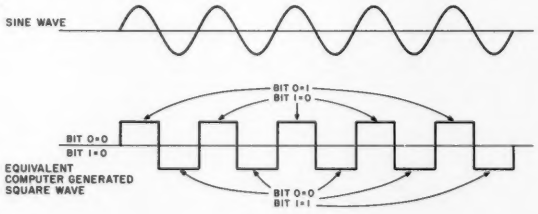


Fig. 2.

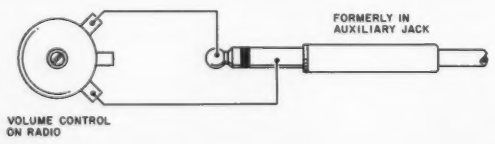


Fig. 1.

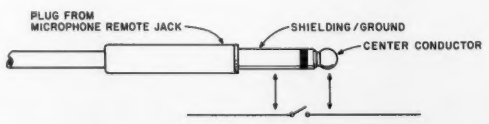


Fig. 3.

Insert the following statements in your program:

```
25 FOR J=1 TO 5: NEXT
35 FOR J=1 TO 5: NEXT
```

Experiment with a few examples of your own.

How about a pulsating tone:

```
 1 DEFINT I-N
10 FOR I = 1 TO 30
20 FOR J = 1 TO 10
30 OUT 255,1: OUT 255,2
40 NEXT
50 FOR J=1 TO 10: NEXT
60 NEXT
```

The major loop (lines 10-60) will generate 30 beeps. Lines 20-40 will create each individual beep. Line 50 will create the space between beeps. Line 1 will reserve names starting with I through N for integers. This is a good practice, for it costs only about 10 bytes which you quickly make up by leaving out the "%" to define an integer. Also, your loops will run faster using integer variables. Besides, have you ever tried to keep track of all those %!#$%!#$ variables?

Thought of any other uses for sound yet? If you think you have a good idea, let us in on it.

Now I'll show you another little-known interface which is standard on the Level II.

What use could you find for a programmable on/off switch? Well, just about any type of computerized timer imaginable.

Inside the keyboard there is a small relay used for turning the cassette recorder on and off. Next time you CSAVE or CLOAD, listen for the relay. Remember that this is a small relay designed only to control the cassette. Radio Shack warns of trying to control your air conditioner with it, but if you must, let this relay control another buffer relay which, in turn, could handle the higher power.

How do I make connnection between the computer (controller) and the device I wish to turn on and off (controllee)? First disconnect the plug from the remote jack on the cassette. Referring to Fig. 3, identify the two parts of the plug. Consider these two parts as you would the two terminals of an SPST switch. You can use alligator jumper leads for now, but if you're going to be using this feature often, you might want to wire up a jack to the controllee. Then all you would have to do after you CLOAD the program is remove the plug from the remote jack and reinsert it in your newly installed jack.

OK, I got it hooked up. Now what? The instruction we use, to finally make this all work, is the OUT instruction to port 255. What's that, you say? That's the same port we used to make sound? True, but we used bits 0 and 1 to make sound. To control the relay, we use bit 2. To turn on the relay, bit 2 must be set to 1 (OUT 255,4). The relay will remain on until bit 2 is reset to 0 (OUT 255,0) and will remain off until set again.

With the right FOR... NEXT loop(s), you could program a timer to turn on or off any device for any amount of time from 1/400 of a second to weeks or months. I won't get into any timer statements here. There are plenty around that you can adapt.

I'm going to let you simmer in this sauce of new knowledge for a while and let you come up with some ideas of your own.

I guess you're wondering what this is all leading up to. What possible use could the ham have for these features?

Well, how about something practical that every ham can use. Have you thought of it yet? Time's up. It's a variable speed, 10-message-memory CW keyer. Told you you'd like it.

Let's go through the program and see just what it will do for you. First of all, we have to come up with some system of encoding our message. We'll use a 59 by 6 array to hold our code table. 59 was chosen to hold all ASCII codes from 32 through 90 (space, special characters, numbers, and the alphabet). 6 was chosen to hold the elements of the larger characters like "." and SK. A 1 indicates a dot while a 3 indicates a dash. A 2 is used only once for the space code. "0" is used only as a filler or position occupier. Example: "A" will be coded as 1,3,0,0,0,0. Data statements 100-103 define our codes. As you have probably figured out, there are no CW codes for a "#" or a "$". You can still put this space to good use. For example, this program used the "#" as an error, "$" as KA, "%" as BT, "&" as SN, "(" as AR, and ")" as SK. Also notice that the comma (3,3,1,1,3,3) is coded twice. The real comma (ASCII 44) will never be used because any comma used in an input string would assume you are asking for two different input variables. To get around this, the semicolon (ASCII 59) is also coded as a comma. You could actually put it in any unused position. A similar problem occurs when using the colon (ASCII 58), so I coded it in the "*" position (shift colon).

At line 500 we set aside enough string space for our message-memory buffers and define our code table.

At line 600 we load up our table from the data statements.

Line 700 gives us the option of using our built-in oscillator (tone) or using our programmable switch (relay). For hookup directions see above. Please keep in mind the small relay. Don't hesitate using a buffer relay.

```
100 DATA 2,0,0,0,0,0, 0,0,0,0,0,0, 0,0,0,0,0,0, 1,1,1,1,1,1,
         3,1,3,1,3,0, 3,1,1,1,3,0, 1,1,1,3,1,0, 1,3,3,3,3,1,
         1,3,1,3,1,0, 1,1,1,3,1,3, 3,3,3,1,1,1, 0,0,0,0,0,0,
         3,3,1,1,3,3, 3,1,1,1,1,3
101 DATA 1,3,1,3,1,3, 3,1,1,3,1,0, 3,3,3,3,3,0, 1,3,3,3,3,0,
         1,1,3,3,3,0, 1,1,1,3,3,0, 1,1,1,1,3,0, 1,1,1,1,1,0,
         3,1,1,1,1,0, 3,3,1,1,1,0, 3,3,3,1,1,0, 3,3,3,3,1,0,
         3,3,3,1,1,1, 3,3,1,1,3,3, 0,0,0,0,0,0, 0,0,0,0,0,0
102 DATA 0,0,0,0,0,0, 1,1,3,3,1,1, 0,0,0,0,0,0, 1,3,0,0,0,0,
         3,1,1,1,0,0, 3,1,3,1,0,0, 3,1,1,0,0,0, 1,0,0,0,0,0,
         1,1,3,1,0,0, 3,3,1,0,0,0, 1,1,1,1,0,0, 1,1,0,0,0,0,
         1,3,3,3,0,0, 3,1,3,0,0,0, 1,3,1,1,0,0
103 DATA 3,3,0,0,0,0, 3,1,0,0,0,0, 3,3,3,0,0,0, 1,3,3,1,0,0,
         3,3,1,3,0,0, 1,3,1,0,0,0, 1,1,1,0,0,0, 3,0,0,0,0,0,
         1,1,3,0,0,0, 1,1,1,3,0,0, 1,3,3,0,0,0, 3,1,1,3,0,0,
         3,1,3,3,0,0, 3,3,1,1,0,0
500 CLS : CLEAR 3000 : DEFINT I-N : DEFSTR S-Z : DIM N(58,5)
600 FOR I=0 TO 58 : FOR J=0 TO 5 : READ N(I,J) : NEXT : NEXT
700 CLS : INPUT "<R>ELAY OR <T>ONE CONTROL";SM :
    IF SM <> "R" AND SM <> "T" GOTO 700
800 CLS : IF SM = "T" THEN IS = 10 ELSE IS = 20
1000 PRINT "ENTER MESSAGE TO TRANSMIT (P,MS#,MR#,CS)" :
     PRINT : INPUT T : IF T <> "P" GOTO 2000
1010 CLS : PRINT "BUFFER #       CONTENTS" : FOR I=0 TO 9 :
     IF S(I) = "" OR S(I) = " " GOTO 1030
1020 PRINT "  "; I; "     "; S(I)
1030 NEXT : PRINT : GOTO 1000
2000 IF LEN(T) <> 3 OR T < "MS0" OR T > "MS9" GOTO 3000
2010 I = VAL(RIGHT$(T,1)) : CLS :
     PRINT "ENTER MESSAGE YOU WISH TO STORE IN BUFFER #"; I; ". . ." :
     PRINT : INPUT S(I) : CLS : GOTO 1000
3000 IF LEN(T) <> 3 OR T < "MR0" OR T > "MR9" GOTO 4000
3010 I = VAL(RIGHT$(T,1)) : CLS :
     PRINT "MEMORY RECALL FROM BUFFER #"; I; ". . ." :
     PRINT : PRINT TAB(4) S(I) : T = S(I) : PRINT : GOTO 1000
4000 IF T <> "CS" GOTO 5000
4010 CLS : PRINT TAB(20) "SPEED IS NOW . . ."; IS : PRINT :
     INPUT "ENTER NEW SPEED"; IS : CLS : GOTO 1000
5000 CLS : PRINT T : FOR J=1 TO LEN(T) : PRINT MID$(T,J,1); :
     L = ASC(MID$(T,J,1))-32 : IF L > 58 THEN L = L-32
5100 FOR K=0 TO 5 : IT = N(L,K) :
     ON IT+1 GOTO 5500, 5200, 5400, 5200
5200 IF SM = "R" THEN OUT 255,4 : FOR M=0 TO IS*IT : NEXT :
     OUT 255,0 : FOR M=0 TO IS : NEXT
     ELSE FOR M=0 TO IS*IT : OUT 255,1 : OUT 255,2 : NEXT :
     FOR M=0 TO IS : NEXT
5300 GOTO 5500
5400 FOR M=0 TO IS*5 : NEXT
5500 NEXT : FOR M=0 TO IS*3 : NEXT : NEXT : PRINT : PRINT : GOTO 1000
```

Program listing.

Line 800 sets the initial speed to 15 wpm. The tone-generating loop takes about 3 times longer than the relay loop, which accounts for the different initial speeds.

Line 1000 asks for the message you want to transmit. At this point you can also enter these key words:

"P" will print the contents of all memory buffers not null or blank.

"MS#", where # is any number from 0 to 9, will permit you to store an often used message (example: CQ CQ CQ DE WB9EGA), up to a length of 256 characters, in the buffer number requested.

"MR#", where # is any number from 0 to 9, will recall a message from the buffer number requested. After a recall, all you have to do to transmit the message is hit ENTER.

"CS" allows you to change the speed of transmission. Increasing the number increases the length of the timing loops, which in turn lowers the wpm.

Lines 1010-1030 take care of the print option.

Lines 2000-2010 control the storing of a message into buffers 0-9.

Lines 3000-3010 recall a message from a buffer.

Lines 4000-4010 display the current speed and ask for the new speed. If you decide not to change the speed, just hit ENTER.

Lines 5000-5500 do the outputting of the message. Here we get a little fancy. We clear the screen and print the entire message. On the next line, we print every character as it is transmitted. This lets you know where you're at. At 5000 we also get the ASCII code of each character and subtract 32 to point us to the right entry in the table. We also check to see if you accidentally entered a lowercase letter (ASCII 97-122). If you did, we convert it back to an uppercase letter so it will fit within the bounds of our table.

At 5100 we scan the 6-digit code of the character we are encoding. If the code is a 1 or a 3, we continue at 5200. If it is a 2, we process a space at 5400. If it is a 0, we do nothing but run out the scan counter.

Line 5200 does the timing for dots and dashes. First we check for relay or tone control:

If relay control—We turn on the relay and delay the right amount of time depending if this is a dot or a dash. A dash being 3 times longer than a dot, you can see why I chose 1 for a dot and 3 for a dash. We can use the same timing loop for each just by using this variable. Anyway, after this time, we turn the relay off and perform another timing loop the length of a dot. This gives us the spacing between the dots and dashes within the character.

If tone control—Basically the same idea as the relay logic except instead of turning on and off a switch, we must generate a square-wave signal.

Line 5400 is a timing loop used for the spacing between words.

At line 5500, the FOR . . . NEXT timing loop is used for the spacing between characters.

And that just about wraps up this exploitation of your TRS-80.

I can't think of any reason why any ham with a TRS-80 would not try this program. Think of the time it would save during contests. This program alone could justify, to your other ham friends, why you bought a TRS-80 instead of that 800-channel, programmable, scanning, remote-controllable, portable, glow-in-the-dark 2-meter rig. Well, here it is. Enjoy. ■

MICROWAVE ATV TRANSMITTER

2.3 To 2.45 GHZ. 75 MW. input
Input video from camera or computer

FACTORY DIRECT $39.95

GIZMO ELECTRONICS

Box164 Radley, KS 66768
(316) 724-6505 ✓229

Free Shipping in U.S. Kansas residents 3% sales tax

HOME BREW "THE SOUTHERN CROSS"

ONE OF THE MOST EFFECTIVE, SIMPLE, STRONG AND INEXPENSIVE, TWO ELEMENT MULTI - BAND

QUADRICUBE ANTENNA

EXTRAORDINARY DX PERFORMANCE IDEAL FOR 20-15 AND 10 METER BANDS. THE TOTALLY PLASTIC MATERIAL & STRUCTURE OF TRIANGULAR SHAPE THAT MATCHES PERFECTLY THE ELECTRONIC REQUIREMENTS, LENDS TO STRAIGHTFORWARD DESIGN THAT REDUCES LOSSES, SIMPLIFIES ADJUSTMENTS & STRENGTHENS CONSIDERABLY THE ANTENNA. MATERIALS REQUIRED ARE OBTAINABLE IN ALMOST ANY LOCALITY. COMPLETE DESCRIPTION, DRAWINGS AND ALL NECESSARY INFORMATION TO BUILD IT, IN ENGLISH OR SPANISH, AIR MAILED TO ANY COUNTRY $20 U.S. CHECK CASHABLE IN U. S. A. TO A. LASCURAIN PINO Nº 59 MEX. D. F. 01030 MEXICO ✓214

We're changing what repeaters can do . . . for YOU!

Whether you're a repeater owner, control op, or user, the RC-850 controller offers you capabilities you've only dreamed of. Like natural sounding speech synthesis . . . easy, remote Touch-Tone programming . . . talking meter readback . . . synthesized remote base operation . . . and an autopatch with features you have to hear to believe.

Most important of all, upgrade through software, prevents obsolescense. Which lets us bring you new features, like our scheduler, for automatic changeover of repeater status by time and day of week . . . And our mailbox, for leaving messages for your friends. Plus much, much more!

The RC-850 Repeater Controller—The New Standard in High Performance!

Ask anyone that owns an RC-850 controller. Or ask us for our demo tape, so you can hear for yourself.

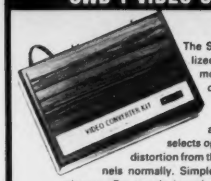
acc advanced computer controls

Call or write for detailed specifications on the RC-850 Repeater Controller. ✓124

10816 Northridge Square ● Cupertino, CA 95014 ● (408) 749-8330

SWD-1 VIDEO CONVERTER

FOR CABLE TV



The SWD-1 Video Converter is utilized on cable TV systems to remove the KHz's signal from a distorted video (channel 3 in/out) and also pass thru the normal undistorted/detected audio signal. Rocker switch selects operating mode to remove KHz's distortion from the video or pass all other channels normally. Simple to assemble—less than 30 minutes. Pre-tuned. Input/output Channel 3. Impedance 75 ohms. 117VAC.

SWD-1 Video Converter Kit **$69.95**

VTR ACCESSORIES

SIMPLE SIMON VIDEO STABILIZER

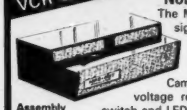
Simple Simon Video Stabilizer, Model VS-125, eliminates the vertical roll and jitter from "copy guard" video tapes when playing through large screen projectors or on another VTR. Simple to use, just adjust the lock control for a stable picture. Once the control is set, the tape will play all the way through without further adjustments. Includes 12V power supply. **SPECIAL**

VS-125 Video Stabilizer, wired ..... Reg. 54.95... **$39.95**

NEW VCR Quality

MODULATOR

Not a Game Type Modulator



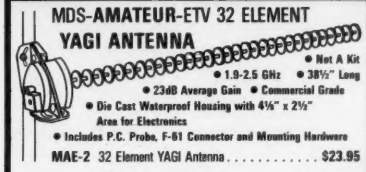
The MPS-1 Kit converts Video/Audio signals to a crystal controlled RF output for TV Channels 3 and 4. The MPS-1 Modulator inputs are designed to match all TV Cameras and VCR's and features a voltage regulated power supply, power switch and LED indicator. No Tuning Required. Operates on 117VAC.

Assembly Time Approximately 5 Minutes

MPS-1 Kit. **$39.95**

UHF ANTENNAS and ACCESSORIES

MDS-AMATEUR-ETV 32 ELEMENT YAGI ANTENNA



- 1.9-2.5 GHz
- Not A Kit
- 23dB Average Gain
- 38½" Long
- Commercial Grade
- Die Cast Waterproof Housing with 4½" x 2½" Area for Electronics
- Includes P.C. Probe, F-61 Connector and Mounting Hardware

MAE-2 32 Element YAGI Antenna **$23.95**

Kato Sons' Down Converter Kit ★1.9 - 2.5GHz★

Designed for Simple Simon by former Japanese CQ Amateur Magazine's UHF Editor/Engineer. Unit utilizes new ingenious Printed Circuit Probe for maximum gain. Circuit board fits inside MAE-2 antenna housing. Requires 1 hour assembly. IC and capacitors pre-soldered.

Model KSDC-KIT 1.9 - 2.5GHz Down Converter Kit **$34.95**

Kato Sons' Regulated Varible DC Power Supply

For use with KSDC-KIT 1.9 - 2.5GHz Down Converter. Completely assembled with Attractive Cabinet, TV/Converter Mode Switch, Frequency Control and LED Indicator.

Model KSPS-1A Assembled Power Supply **$23.95**

SPECIAL INTRODUCTORY SAVINGS

ORDER ALL THREE ITEMS

MAE-2, KSDC-KIT and KSPS-1A for Only..... **$74.95**

Regular price if ordered separately $82.85

— CO-AX CABLES ARE NOT INCLUDED —

ZYZZX VHF-UHF Wideband Antenna Amplifier

Revolutionary New HYBRID IC Broadband Amplifiers

50 MHz - 900 MHz

Model ALL-1 12dB Gain
Model ALL-2 35dB Gain

These units are not available anywhere else in the world. Each unit will serve many purposes and is available in Kit or Assembled form. Ideal for outdoor or indoor use. I/O impedance is 75 ohms. Amplifiers include separate co-ax feed power supply. Easily assembled in 25 minutes. No coils, capacitors to tune or adjust.

ALL-1 Complete kit w/power supply **$24.95** — **ALL-1** Wired/Tested w/pwr supply **$34.95**
ALL-2 Complete kit w/power supply **34.95** — **ALL-2** Wired/Tested w/pwr supply **44.95**

Our New STVA 14.5dB GAIN, 14 ELEMENT CORNER REFLECTOR YAGI ANTENNA

STVA-3 Yagi Antenna, 14.5dB Gain, Selectable 75 or 300 ohm Channel 60-80..... **$19.95**

STVA-4 Yagi Antenna, 14.5dB Gain, Selectable 75 or 300 ohm Channel 44-52..... **$19.95**

RG-59/U 75 ohm Low Loss Coax Cable... **$.12**/ft. — **F-59** Coax Connector... **$ .39** ea.
MT-1 Special UHF 75-300 ohm Matching Transformer..... **$1.45** ea.

Switch to Bambi™!

Electronically

Bambi Electronic Video Switch ... makes switching of your VCR/VTR, Pay TV Decoders, Cable TV, Video Discs, Video Games, Closed Circuit TV, Antennae and Microcomputer as easy as pushing buttons.

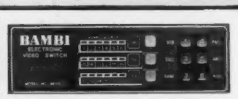
The Bambi Electronic Video Switch is an electronic switching network which can accept up to six different sources of video signals and provide the flexibility of directing the inputs to any or all of the three outputs.

Now you can eliminate ... the drudgery of disconnecting and reconnecting your video equipment each time you use it ... the tangled mess of cables which are impossible to trace out ...not being able to use more than one function at a time.

Bambi lets you enjoy using your video equipment the way it should be ... electronically and on line at the push of a button.

Model BEVS-1 Completely Wired and Assembled. Includes comprehensive Instruction/Operation Manual and Decal Set for customizing your Video Switch installation. **$129.95**

FREE Bambi Poster with any purchase



Bambi's front panel was designed with the user in mind. Computer styled construction, with soft-touch keyboard (rated for over 10 million operations), arranged in matrix form allows easy input/output selection without refering to charts. Functions selected through the keyboard are immediately displayed on the 18 LED status indicators.

Check the quality of Bambi against that of much higher priced competition. All solid state electronic switching provides low attenuation (3dB), wide frequency response (40-890 MHz), and excellent isolation between signal sources (each I/O section individually sheilded for 65dB min. isolation).

Bambi's Specifications:

Input/Output Impedance	75 ohm
Signal Loss	3dB ±1dB
Noise	4dB ±1dB
Input Return Loss	12dB min.
Isolation	65dB min.
Power Req.	117VAC 60 Hz, 2W
Dimensions	10¼ W x 6⅝ D x 3¼ H
Weight	4½ lbs

7+11 PWD PARTS KITS

INTRODUCING OUR 7+11 PWD PARTS KITS

ITEMS 1-15 SPECIAL $124.95

Kit No	PART No	DESCRIPTION	PRICE
1	1VT1-PWD	Varactor UHF Tuner	$24.95
2	2CB1-PWD	Printed Circuit Board, Pre-drilled	18.95
3	3TP11-PWD	PCB Potentiometers 4-20K, 1-5K, 2-10K, 2-5K, 1-1K, and 1-50k. (11 pieces)	8.95
4	4FR-31-PWD	Resistor Kit, ¼W, 5% 29-pcs, ½ W 2-pcs	4.95
5	5PT1-PWD	Power Transformer, PRI-117VAC, SEC-24VAC at 500ma	9.95
6	6PP2-PWD	Panel Mount Potentiometers and Knobs, 1-1KBT and 1-5KAT with switch	5.95
7	7SS17-PWD	IC's 7-pcs, Diodes 4-pcs, Regulators 2-pcs Transistors 2-pcs, Heat Sinks 2-pcs	29.95
8	8CE14-PWD	Electrolytic Capacitor Kit, 14-pieces.	6.95
9	9CC20-PWD	Ceramic Disk Capacitor Kit, 50 WV, 20-pcs	7.95
10	10CT5-PWD	Varible Ceramic Trimmer Capacitor, 5-65pfd, 5-pieces	4.95
11	11L5-PWD	Coil Kit, 18mhs 3-pcs, .22µhs 1-piece (prewound inductors) and 2 T37-12 Ferrite Toroid cores with 6 ft. #26 wire.	8.00
12	12ICS-PWD	IC Sockets, Tin inlay, 8 pin 4-pcs, 14 pin 1-pc and 16 pin 2-pcs.	2.95
13	13SR-PWD	Enclosure with PM Speaker and Pre-drilled Backpanel for mounting PCB and Ant. Terms	14.95
14	14MISC-PWD	Misc. Parts Kit, Includes Hardware, (6/32, 8/32 Nuts & Bolts), Hookup Wire, Solder, Ant. Terms DPDT Ant. Switch, Fuse, Fuseholder, etc	9.95
15	15MC16-PWD	Mylar Capacitors, 14-pcs and Silver Mica Capacitors 2-pieces	7.95
		When Ordering All Items, (1-15), Total Price	**$89.95**

CUSTOMER NOTICE: BUY WITH CONFIDENCE ... BEWARE OF LOW QUALITY IMITATORS. All of our kits consist of **New, 1st Class, RF Quality, Parts Engineered for Optimum Operation,** not factory seconds or stock close-outs. We service your completed kits that you've purchased and built. You will never get stuck with a **BAG OF PARTS** when ordering from Simple Simon.

SIMPLE SIMON ELECTRONIC KITS,™ Inc.

3871 S. Valley View, Suite 12, Dept. 7, Las Vegas, NV 89103

NEED 6 OR MORE OF AN ITEM? WRITE FOR QUANTITY DISCOUNTS

In Nevada Call: **702-871-2892**

Outside Nevada Call: **1-800-782-3716**

Available by Mail Order Only
Send Check* or Money Order. Minimum Order: $16.95. Add 10% Shipping and Handling on orders under $40.00. For orders over $40.00, add 5%. Minimum Shipping and Handling $2.00. Cat. $1.00
— VISA and Mastercard Acceptable —
*Check orders will be held 30 days before shipping.

THE AUTEK "QRM ELIMINATOR"

Model QF-1A For SSB & CW
$69.00 (+$4)

115 VAC supply built-in. Filter by-passed when off. | **Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.** | **Four main filter modes for any QRM situation.** | **Continuously variable main selectivity (to an incredible 20 Hz!)** | **Continuously variable main frequency. (250 to 2500 Hz)**

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will due to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp.

Built-in 115 VAC supply. 6½x5x2½. Two-tone grey styling.

Even latest rigs include only a fraction of the QF-1A selectivity. Yet it hooks up in minutes to ANY rig--Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Heath, Collins, Ten-Tec, etc. Just plug it into your phone jack and connect spkr. or phones to the output. Join the thousands of owners who now hear stations they couldn't copy without a QF-1A! It really works!

WORLDS RECORD KEYER. OVER 4000 DX QSO'S IN 2 DAYS!

$100.50 (+$4)
Model MK-1 Keyer

Probably the most popular "professional" contest keyer in use, yet most owners are casual CW operators or novices. After a few minutes, you'll see how memory revolutionizes your CW operation! Just start sending and record your CQ, name, QTH, etc. in seconds. 1024 bits stores about 100 characters (letters, numbers). Playback at any speed. Dot/dash memories, triggered clock, repeat, combine, 5 to 50+ WPM, built-in monitor and 115 VAC supply. Works with any paddle. Sit back and relax while your MK-1 calls CQ and handles standard exchanges!

Optional memory expander (ME-1) expands any MK-1 to 400 characters. ME-1 factory installed $35. Owner installed, only $21 (+$4). Add more memory now or later!

Autek Research
BOX 302 DEPT. S
ODESSA, FLORIDA 33556 • (813) 920-4349

NO LONG DELAYS. WE SHIP 95% OF ORDERS FROM STOCK

We sell only factory direct. No dealer markup in our price. Order with check, M.O., VISA, MC. Add $4 postage and handling in 48 states. ($7 for UPS air). Add $7 to Canada, Hi., Ak. Add $22 elsewhere (shipped air). Add 5% tax in Fla.

Don't Be Left Out in the Cold with the Russian Woodpecker

GET A MOSCOW MUFFLER™

Another first from AEA. The Woodpecker Blanker, WB-1 really works. This unit effectively blanks the pulsing interference of the Russian Woodpecker. Two versions are available, the WB-1 for use with communication receivers and WB-1C for use with all popular transceivers.

This extremely useful accessory is designed for direct insertion between your receiver (or transceiver) and the antenna. It is both MORE EFFECTIVE than I.F. type blankers and requires NO MODIFICATIONS to your receiver! The unit operates from a 13 VDC ± 2 VDC power source at less than 575 mA. (AEA AC wall unit AC-1 will operate the blanker.)

The blanker works well on both CW and SSB modes that are being interfered with by a woodpecker. Controls on the front panel include; four push button switches, a synchronize control and a width control The WB-1 also features a low-noise untuned broadbanded 6 db gain pre-amp which can be selected with or without the blanker enabled. The WB-1C uses the same circuitry but includes a carrier operated relay (COR). This provides protection to the receiver section during transmissions from the attached transceiver.

Prices and Specifications subject to change without notice or obligation.

ege, inc. ↙453
13646 Jefferson Davis Highway
Woodbridge, VA 22191
(703) 643-1063: Information and Virgina calls.
1-800-336-4799: orders only.

AEA Brings you the Breakthrough!

RTTY·PAK INTERFACE FOR TRS·80* COLOR COMPUTERS

- Simply plug into Program Pak* slot.
- No software to load. it is in ROM.
- Split screen features word wrap and continuously displays status.
- Selective calling stores incoming messages on cassette tape.
- Baudot and ASCII modes **(8 speed)**.
- Standard EIA signals to your T.U.
- Complete documentation supplied.

Model 4511: $169.95
Model 4511A (8 Speed): $189.95

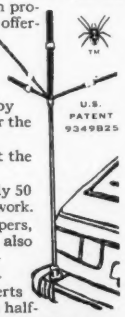
RIDGE SYSTEMS CO., INC.
Tested & assembled. 90 day warranty. we pay shipping. Mass. residents add 5% sales tax
*A trademark of Tandy Corp ↙171
P.O. Box 772. Acton, MA 01720 (617) 264-4251

The Spider™ Antenna

The modern multi-band mobile antenna —switch to 10, 15, 20 or 40 meters without stopping to change resonators.

Features of the Spider™ Antenna

- The Spider™ Antenna is less than six feet high and the longest resonator projects out from the mast 24 inches. This gives a slim profile, low height and light weight, offering little wind resistance and eliminating the need for a spring mount.
- Each resonator is tuned to the desired portion of the band by a tuning sleeve which slides over the outside of the resonator.
- SWR is approximately 1:1 at the selected resonant frequency.
- Base impedance approximately 50 ohms, requiring no matching network.
- Ideal for use on vans, campers, motor homes, travel trailers; also in mobile home parks, apartment houses and condominiums.



The Spider™ Adapter converts any mono-band antenna with a half-inch mast into a modern four-band antenna.

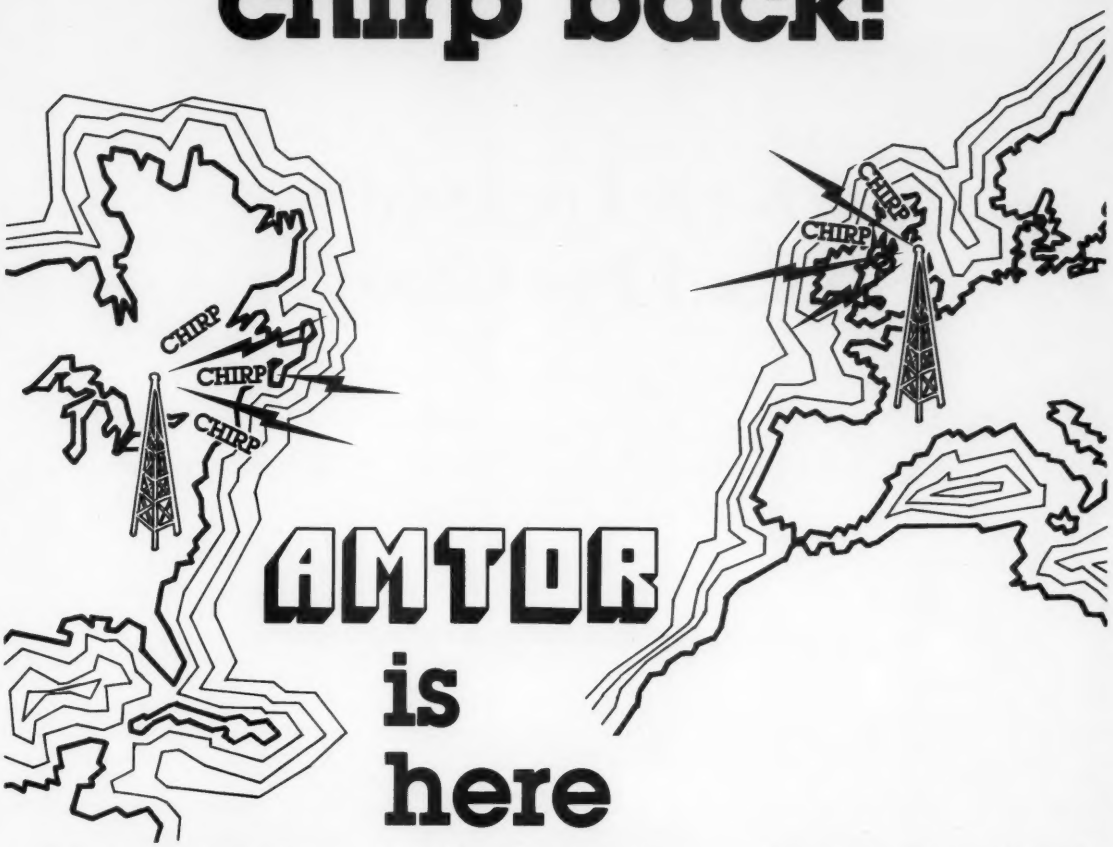
The Spider™ Maritimer™ is the ultimate for marine use. Made of non-magnetic stainless steel and nickel-chrome plated bronze, using regular Spider™ resonators and tuning sleeves.

Accessories — Bumper, ball, angle and stud mounts. Quick disconnects. RG-58A/U coaxial cable and connectors. Ground radial systems. Copper foil and copper braid ground straps.

For further information, prices write or call

MULTI-BAND ANTENNAS
7131 OWENSMOUTH AVENUE, SUITE 463C
CANOGA PARK, CALIF. 91303
TELEPHONE: (213) 341-5460 ↙173

Now you can chirp back!



AMTOR is here

Been wondering what those "chirp-chirp" signals were around 14075? They're AMTOR, AMateur Teleprinting Over Radio. European hams have been enjoying the benefits of error free RTTY for sometime. (It's a must for commercial Maritime traffic.) Now, U.S. Amateurs are on the threshold of a new era of RTTY.

Old problems of QRM, QRN, & QSB are gone! If a propagation path exists, AMTOR will get the message thru — with no "hits" — "newspaper" perfect copy!

Two modes are available; AMTOR mode A transmits a three character block specially coded so that the receiving station can recognize an error. The three character block is repeated until the receiving station confirms reception by replying with the proper control code signal. Flawless print is possible with this "hand-shake" style operation.

Mode B, "FEC" or Forward Error Correction, is actually a time diversity mode where text is repeated and intermixed in the transmission. The receiving station unscrambles it and prints the clear text. This "broadcast" mode allows more than two stations to communicate. It's more effective than conventional Baudot or ASCII, but not as reliable as AMTOR mode A.

The actual DATA transfer in either AMTOR mode is nominally equivalent to conventional RTTY at 50 baud, or 66 WPM.

A receive only "Listen" mode is also available for reception of mode A data by a station not directly involved in the "hand-shake" communication.

Start with a new AMTOR ACT-1, ATR-6800, or update your present system.

Microlog is ready with AMTOR! Give us a "chirp" at Microlog Corporation, 18713 Mooney Drive, Gaithersburg, MD 20879. TEL (301) 258-8400. TELEX 908153

51

MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

See List of Advertisers on page 114

Walt Becker K1QPS
Box 201
New Castle NH 03854

Adam M. Perkins WA1UNU
33 Winter Street
Farmington NH 03835

New England's Nicad Per-Charger

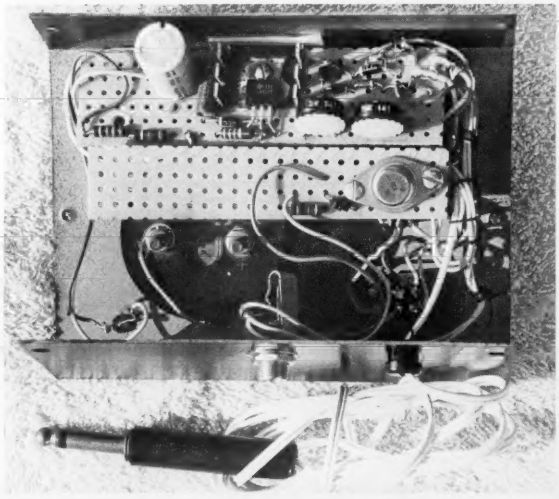
Build this and get state-of-charge readout, automatic shutdown, and charge maintenance for your HT. This could be the gift of life for your battery pack.

If you use an HT, you will very likely have two battery packs. Proper cycling of charge and discharge is essential for long life for nicad batteries. Carelessness in this regard has recently cost us cells in three nicad packs. One was in a pack for an FT-207; the others were in packs for TR-2400 radios.

Use of the HT auto per-charger will remedy this. It was designed for mobile use, but we have found it invaluable for use in the shack as well. What a pleasure to push a switch and instantly read the state of charge of your battery. It's also great to have automatic shutdown and charge maintenance without time- or record-keeping. The per-charger was designed for the usual 8-cell 9.6-volt pack but is easily modified for another configuration. It incorporates a circuit—Z2-TR1—to protect the HT (which can be used while on charge) from voltage spikes or component failure. It also has a manual override to allow careful charging of the really *dead* battery.

Construction was done on perfboard. The board was insulated from and attached to the chassis with two-sided adhesive tape. A 0-1-mA meter was used and the necessary shunts were made as follows: The 100-mA shunt, with a resistance of about .8 Ohms, was made by winding 57.25 inches (145.4 cm) of #32 AWG enameled copper wire on a 2-Watt 1-meg resistor or other suitable insulating rod about ¼ inch in diameter. The 600-mA shunt, with a resistance of about .13 Ohms, was made by winding 23.4 inches (59.4

HT auto per-charger.



Component layout.

cm) of #28 AWG enameled copper wire on a similar form. The shunts may be checked with a test milliammeter in series with the charger and a battery, in case of slight irregularities in wire size, etc. If the charger meter reads too high, the shunt wire is too long. If the reading is low, the shunt wire should be lengthened slightly.

The percent meter is easily calibrated. With S1 thrown to the percent position and S2 to the high-range (manual) position, attach a voltmeter from PL2 to ground. Temporarily strap J1 to the regulated output at S1a. Adjust R3 for an 11.2-volt reading on the test meter and adjust R4 for a full-scale reading on M1. Then adjust R3 for an 8.4-volt output and check M1 for a zero reading. If necessary, add or subtract diodes in the D1-D5 string to correct this zero reading. Recheck the full-scale reading. Any combination of zener and silicon diodes that will reach 8.2 to 8.4 volts at the M1 meter is acceptable. Throw S1 to the mA position, S2 to the 100-mA position, and set R2 for 11.2 volts at J1.

The TR-2400 has no diode in the battery circuit in the transceiver. If your HT has one, as has the Tempo S1, strap it out and install a diode in the positive cable lead of the wall charger to maintain the input voltage properly. Do not open the wall charger case. Be sure to check your battery specs for the proper charging rate. When starting a charge or when using your auto percharger with a dead battery, always use the high-scale (manual) position of S2 until you are sure that the current has dropped to a safe value, then you may shift to the taper (100-mA) position.

Use the center OFF position of S1 when plugging in or unplugging your HT. The percentage of charge can be checked at any time.

Any 13.8-volt supply can be used, or, if mobile, the cigarette lighter socket is a convenient source of power.

If you have 2 batteries for your rig, extend their life by using one until it is discharged to the zero point on M1, then fully recharge it while using the other. We have found the HT auto percharger to provide the utmost in convenience while using the HT mobile or portable. ■

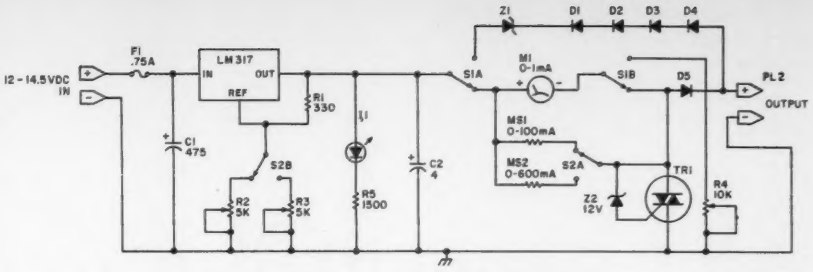


Fig. 1. Circuit schematic.

Parts List

	Radio Shack No.	
LM317	276-1778	$3.99
Z1 6.2-V zener	276-1561	.45
Z2 12-V zener	276-563	.45
Cabinet	270-264	4.95
Heat sink	276-1363	.79
D1-D5 diodes	276-1102	1.50
R2 5k pot	271-217	.59
R3 5k pot	271-1714	1.09
R4 10k pot	271-218	.59
S1 DPDT c off	275-620	2.39
S2 DPDT	275-614	2.19
I1 LED green	276-034	.50
M1 0-1 mA	270-1752	8.95
Tr-1 triac	276-1001	.99
F1 ¾-A fuse	270-1272	.20
Fuse holder	270-364	.89
P1 2 for TR-2400 for Tempo S1	274-1550 274-286	.90 .65
C1 475 uF 35 V	272-1030	.99
C2 4 uF 35 V	272-1024	.49
R1 330 Ohm ½ W	271-017	.10
R5 1500 Ohm ½ W	271-025	.10
R6 1000 Ohm ½ W	271-023	.10
Knob	271-1714	.40
Perfboard	276-1394	1.79
2 2-meg 2-W res.		.38 pr.
Source—Radio Service Lab, Manchester NH		
MS1—6' #32 AWG wire for 100-mA shunt		.11
MS2—2' #28 AWG wire for 600-mA shunt		.09
Source for AWG wire—Commercial Dist., Portland ME (RCA) or any motor or instrument repair shop		
	Total	$35.96

TUSA
A WHOLE NEW WORLD OF TV VIEWING WITH TUSA'S NEW MODEL CVU-40, 40 CHANNEL CABLE TV CONVERTER
Receive all the EXTRA CABLE TV "MIDBAND" & SUPERBAND CHANNELS on your UHF DIAL.
Eliminates the need for renting or leasing. This stable and reliable system converts extra cable TV channels so they can be received on the UHF tuner of your TV set.
Size of this unit may be subject to color by your local cable TV Co.
A MUST FOR VIDEO-TAPING FROM CABLE TV!
The system allows you to program both pay (pay TV decoder required) and standard cable channels for taping on any VCR — while you are watching a different channel on your TV.
Simple to install and operate on any make of TV with UHF.
Now $28.95 ea. PLUS POSTAGE
NOW AVAILABLE
NEW TUNEABLE DELUXE MODEL CVU-1000 $34.95 ea.

WINEGARD
75 OHM UHF YAGI ANTENNAS
12 db GAIN
CHANNELS 44 - 52
18.95 EA.
6 OR MORE
16.95 EA.
OPTIONAL
Winegard UHF Antenna Preamp
18db Gain
39.95 ea.

BRAND NEW UHF VARACTOR TUNERS
Sanyo Output
YOUR CHOICE
$24.95 ea.
Call for Quantity Prices
Mitsumi 45 MHz Output

POPULAR MICROWAVE PARTS
MRF-901 ..... $2.75
9 - Up 2.19
MRF-911 ..... 3.46
9 - Up 3.12
MBD-101 ..... .98
CHIP CAPS .001 mfd ..... .50
26 - Up ..... .30
2N6603 (formerly MRF-902) 11.95

Special Purchase
MV-2109
33pf Tuning Diode
1 - 9 ..... $.69 ea.
10 - Up ..... .59 ea.

5% MICA CAPS 5%
10pf . . .42¢ ea. 560pf . .66¢ ea.
43pf . . .36¢ ea. 1200pf . .89¢ ea.
110pf . . .36¢ ea. 3000pf 1.39 ea.

Radial Lead Caps
10 mfd@35V ..... 1 - 11 $.25 ea.
12 or more .10 ea.
1 mfd@35V ..... 1 - 11 .25 ea.
12 or more .16 ea.
470 mfd@35V ..... 1 - 11 .59 ea.
12 or more .49 ea.
1000 mfd@35V ..... 1 - 11 .89 ea.
12 or more .69 ea.
2200 mfd@35V ..... 1 - 11 1.29 ea.
12 or more 1.09 ea.
2200 mfd@50V ..... 1 - 11 1.69 ea.
12 or more 1.39 ea.

Axial Lead Caps
1000 mfd@50V ..... 1 - 11 $.99 ea.
12 or more .79 ea.
2200 mfd@35V ..... 1 - 11 1.39 ea.
12 or more 1.19 ea.
3300 mfd@35V ..... 1 - 11 1.99 ea.
12 or more 1.79 ea.
100W ± 10% Polyester Film (Mylar)
1-9 10-49 50-99
.001mf .20 .15 .08
.0022mf .20 .15 .08
.01mf .20 .15 .08
.047mf .20 .15 .08
1mf .20 .15 .08
22mf .30 .27 .22

POPULAR IC's
TOP QUALITY
NO SECONDS

TYPE	DESCRIPTION	1 - 9	10 - UP
LM-380N	2 watt Audio Power Amp	$1.49	$1.12
LM-386N-3	Low Voltage Audio Amp 500MW/9V	1.59	1.19
ME-564N	Digital Phase Locked Loop	3.50	2.89
LM-565N	Phase Locked Loop	1.49	1.12
LM-733N	Video Amp	1.69	1.27
MC-1330	Video Detector	2.49	1.87
MC-1349	Video If Amp	2.08	1.55
MC-1350	Video If Amp	1.75	1.31
MC-1352	Video If Amp AGC	2.69	2.09
MC-1358	Audio If Amp	1.95	1.46
MC-1374P	R.F. Modulator	3.19	2.39
MC-1458	Dual Comp. Op Amp	.89	.69
MC-1496N	Balanced Mod/Demodulator	1.79	1.34
LM-1800	PLL Stereo Decoder	4.49	3.37
LM-1889	Video Modulator	2.95	2.21
	LINEAR VOLTAGE REGULATORS		
LM-7805	5 Volt Positive Volt. Reg.	1.39	1.04
LM-7808	8 Volt Positive Volt. Reg.	1.39	1.04
LM-7812	12 Volt Positive Volt. Reg.	1.39	1.04
LM-7815	15 Volt Positive Volt. Reg.	1.39	1.04
LM-7818	18 Volt Positive Volt. Reg.	1.39	1.04
LM-7824	24 Volt Positive Volt. Reg.	1.39	1.04

CHROME PLATED LED INDICATORS
These sealed T 1¾" Red LED indicators are perfect for any electronic project. Limiting resistor required.
59¢ ea.
12 - Up 39¢ ea.

TUSA
MAX-2
LOW LOSS MATCHING TRANSFORMERS
Indoor 75 - 300 ..... $ .98
10 - Up ..... .79
Outdoor 75 - 300 ..... 1.69
10 - Up 1.19

PROJECT BOXES
Woodgrain
This box is 11¾"W - 4½"H - 6½"D with a removable aluminum U-shaped chassis 11"W - 3¼"H - 6"D inside.
$12.50 ea.
4 or more $10.95 ea.

UHF - VHF - FM SPLITTER
40-300 MHz
Ask For RF2TV
Low Loss 3.5-4 db, Low VSWR
Waterproof Housing
1-9 $2.49 ea.
10-Up $1.89 ea.

PC BOARD SOLDER
SOLDER
This high quality 60/40 resin core solder, .032 dia., is perfect for PC Board work.
#SN60 1 lb. Reels $9.95 ea.

WINEGARD DELUXE A-B SWITCH TV-1051
For CATV - MATV - VCR
75 ohm - 90 db isolation
While They Last $6.95 ea.

AC LINE CORDS
18 gauge wire
6 ft. long cable
Prestripped and tinned ends for easy installation.
49¢ ea.
AC-6G 12 - Up 39¢ ea.

POPULAR MISCELLANEOUS PARTS
IN4001 Diodes
15 for $1.00
100 for 5.00
¼ w 10K Thumbwheel pots
1 - 12 ..... .39
13 - Up ..... .29
Toroids - T30-12 ..... .49
20 - Up ..... .25
Toroids - T37-2 ..... .39
20 - Up ..... .25

ORDER NOW
TOLL FREE
800-854-4655
OUTSIDE CALIFORNIA
714-635-5090
INSIDE CALIFORNIA
R.F. ELECTRONICS
1056 N. STATE COLLEGE BLVD., DEPT. G
ANAHEIM, CALIFORNIA 92806
PERSONAL CHECKS HELD FOR CLEARANCE
OPEN TUES - FRI 10 - 6
SAT 10 - 5
CLOSED SUN & MON
MAIL ORDERS WELCOME — INCLUDE POSTAGE — SHIPPED SAME DAY RECEIVED — NO MINIMUM ORDER

✓156 See List of Advertisers on page 114

Al Torres KP4AQI
4850 Hollywreath Court
Dayton OH 45424

Immortalize Your IC-2AT Battery Pack

Why waste your nicads when you're in the car? Build this miniature power supply and your batteries will last forever.

It wasn't long after I received my Icom IC-2AT that I realized the limited battery life of the pack supplied with the unit (BP-3). The pack is rated at 8.4 V @ 250 mAh, which is relatively marginal for the power output of the unit (1.5 W and .15 W). Since most of my transmissions are made while in the car, the idea of saving my batteries for utilization outside the car became extremely attractive. The solution then was either to get an Icom IC-CP1 cigarette lighter recharger for the BP-3 or do something else. The solution of using the lighter charger is simple, though in the long run you pay a penalty; that is, there is no sure way of making the transceiver draw power from the lighter or the battery. It is normally a joint effort since the lighter plug, because of the current-limiting capabilities, can't supply enough power when transmitting. The result is that you reduce the power being drained from the battery pack, but it is not eliminated.

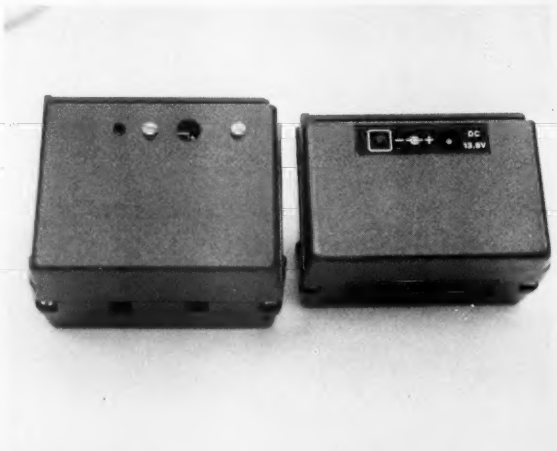
After attending the Hamburg, New York, hamfest, I was able to acquire an IC-BP-4 battery pack for the 2AT. This is nothing more than a case without batteries which is able to accept six AA nicads for a total voltage of 7.5 V at 500 mAh. Icom rates the output of this pack at 1 W or .1 W, which is too little for comfort. So the idea of putting a regulator inside this battery pack and giving the IC-2AT 11.3-V, 1-Amp capability became extremely attractive. By the way, with the above voltage of 11.3 V, the 2AT pumps out a solid 2.8 W or .28 W depending on the power switch on the unit.

Having my concept reduced to practice was extremely simple. The circuit is shown in Fig. 1. All it is is a simple regulator set at 11.3 volts with a crowbar network just in case the regulator dies (so that it doesn't kill my transceiver). According to the folks at Icom, the unit is capable of sustaining a voltage of 12.5 V; any voltage above that might or might not make your 2AT a piece of history. So why take a chance?

The Circuit

Power is obtained from the lighter plug in my car. The 12 to 15 volts are then

New battery pack and power cord with the IC-2AT.



New pack on left, standard pack on right.

filtered by C1; this is a good practice since ignition noise and generator whine could cause problems later on. The combination of R1 and D4 is just an indicator to tell me when I do have power coming into the unit. Since I drive a car in which all systems are switched off by the ignition, this feature is very convenient. The regulator used is a 5-volt unit that is "lifted" above ground by the zener diode, D1 (a 6.2-V zener), to give us roughly 11.3 volts. The normal sinking current of the regulator is about 4 mA, surely not enough to bias the zener, D1, outside the conduction knee, so another 22 mA of biasing current is provided from the R2 resistor. This gives us a very clean zener voltage of about 6.3 volts. The crowbar circuit is very simple and is made to kick in at 12 volts. When the output voltage reaches 12 volts (it should never do that if your regulator is working properly), it turns on the zener diode, D2, which generates enough voltage across R3 to set the SCR into conduction. This SCR will essentially short the output voltage, thus blowing the 1-A fuse.

Construction

First remove all battery clips from the inside of the BP-4 pack. Cut a piece of aluminum 1-7/8" long by 1" wide. Drill holes to mount the TO-3 regulator. You can then mount this regulator vertically by simply using L-brackets or Super Glue against one side of the plastic battery guide. On the second rail from the bottom, mount the terminal strip (you should cut the two corner lugs from this 5-lug strip). All wiring is done between the lugs and the legs of the regulator. The input capacitor and crowbar circuit are mounted in the first rail with the fuse on the center rail. Do not use a fuse holder; just solder to the fuse ends and route the fuse accordingly. On the lid of the housing and using the belt-clip holes designed to provide power to the BP-3, drill a 1/4" hole and 1/8" hole for the LED indicator. Mount the coax power jack using two screws (if you can find No. 2 screws and nuts, that's ideal; otherwise you must go with No. 4). The lid and the main battery pack are connected with two color-coded wires.

Check-Out

Connect a power supply providing 14 V dc to the input of the unit. The output should read 11.3 V dc. Now increase this voltage to 16 volts and check for the output voltage to be at 11.3. Your unit is now ready for testing on your IC-2AT.

I have used this unit for three months now and it functions beautifully. Since I do operate sometimes from fringe areas, I drive a little amplifier located in the back of my car that takes my 2.8 W and makes them 40 W. Such an arrangement is very desirable, since when leaving the car the radio is put on my belt and the amplifier is in the trunk out of sight. To say the least, there are no worries about something being stolen.■

HIGH PERFORMANCE PRESELECTOR-PREAMP

The solution to most interference, intermod, and desense problems in **AMATEUR** and **COMMERCIAL** systems.

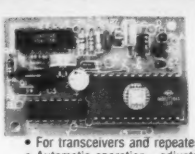
- 40 to 1000 Mhz - tuned to your frequency
- 5 large helical resonators
- Low noise - High overload resistance
- 8 dB gain - ultimate rejection > 80 dB
- 10 to 15 volts DC operation
- Size - 1.6 x 2.6 x 4.75" exc. connectors
- **FANTASTIC REJECTION!**

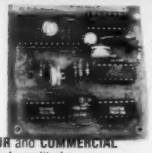
Typical rejection:
±600 Khz@144 Mhz: −28dB
±1.6 Mhz@220 Mhz: −40dB
±5 Mhz@450 Mhz: −50dB

Price - $69.95 bipolar w/RCA jacks
Connector options: BNC $5, UHF $6, N $10
SUPER HOT! GaAs Fet option $20

AUTOMATIC IDENTIFIERS

ID-1





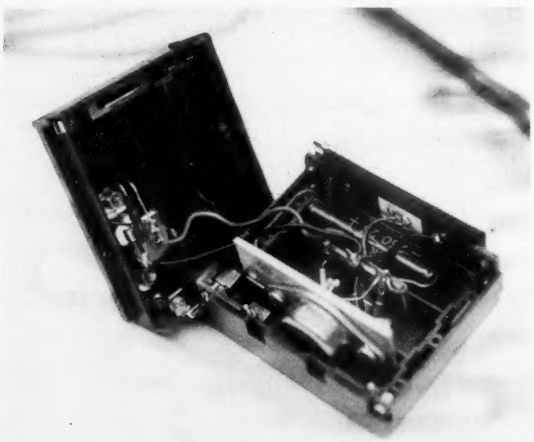
ID-2

- For transceivers and repeaters - **AMATEUR** and **COMMERCIAL**
- Automatic operation - adjustable speed and amplitude
- Small size - easy installation - 7 to 15 volts DC
- 8 selectable, reprogrammable messages - each up to 2 min. long
- Wired, tested, and programmed with your message(s)
  Model ID-1 - $39.95 Model ID-2 w/2 to 10 minute timer - $59.95

We offer a complete line of transmitter and receiver strips and synthesizers for amateur and commercial use.
Request our free catalog. *Allow $2 for UPS shipping - Mastercard and VISA welcome*

GLB ELECTRONICS
1952 Clinton St. Buffalo, NY 14206
716-824-7936, 9 to 4

143



Parts arrangement inside the new BP-4.

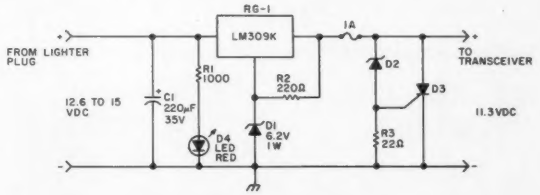


Fig. 1. Battery eliminator for the IC-2AT. D1—6.2-V zener, 1 W, 1N4735 (RS 276-561); D2—12-V zener, 1 W, 1N4742 (RS 276-563); D3—6-A SCR, TO-220 (RS 276-1067) C106; D4—LED red TLR-107 (RS 276-033); R1—1000Ω, 1/4-W resistor; R2—220Ω, 1/4-W resistor; R3—22Ω, 1/4-W resistor; C1—220-μF electrolytic capacitor, axial 35 V dc (RS 272-1017); RG-1—LM309K regulator, 5 V; coax plug (RS 274-1550) and coax jack (RS 274-1549); tie-down terminal strip, 5 lug (RS 274-688); F1—1-Amp fuse (RS 270-1273); lighter plug—RS 274-331; BP-4 Icom battery pack.

See List of Advertisers on page 114

2300 MHz VARIABLE DOWNCONVERTER

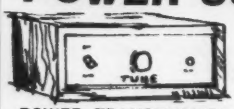
ANTENNA KIT

$16.95

32 WASHERS
31 SPACERS
MOUNTING BRACKET
6" RG 174 COAX
'F' CONNECTOR
• 35" ROD
6½" x 4" P.V.C. PIPE
2 DRILLED END CAPS
• HARDWARE

POWER SUPPLY KIT

$16.95



POWER TRANSFORMER
COURSE TUNE POT.
FINE TUNE POT.
3 'F' CONNECTORS
RESISTORS & CAPS
LED WITH HOLDER
TERMINAL STRIP
P.C. BOARD
RF CHOKE
KNOB
WIRE
2 SWITCHES
4 DIODES
LM 317 REG.

WOOD GRAIN CABINET WITH SILK SCREENED front and back $10.95 Extra

BUILT POWER SUPPLY.....$34.95

Complete Down Converter System
INCLUDES
ANTENNA KIT
POWER SUPPLY KIT
CONVERTER KIT
SPECIAL $49.95

QUANTITY DISCOUNTS
Any Price in Adv.

10 pcs.	12% off
25 pcs.	18% off
50 pcs.	25% off
100 pcs.	30% off
1000 pcs.	35% off

No Mixing for Quantity Discount

PARTS

Converter P.C. Board Plated through holes for stability.....$4.95
Power Supply P.C. Board 2.95
MRF 901 .....2.00
NEO2135 .....4.95
2835 Diodes ..... .95
.001 Chip Caps. 10/3.95
Choke Set of 4.....1.95
LM 317 Regulator 1.25
'F' Connectors Chassis ..... .50
Wall Transformer 12 VAC 700 MA....4.95
'U' Bolt 95
BALUN 75 to 300 ohm.....1.95
BALUN for rabbit ears....2.95
*RG 59/U COAX WITH CONNECTORS FACTORY MADE

100 Ft.	$17.50
50 Ft.	9.50
25 Ft.	5.75
3 Ft.	2.50

CONVERTER KIT

$16.95

P.C. BOARD PRE-DRILLED SOLDER PLATED WITH PLATED THROUGH HOLES FOR A MORE STABLE PICTURE.

NEW!! ..... 2137 HOT TRANS...

3 ~~MRF 901 TRANSISTOR~~
2 HP 2835 Diodes
6 .001 Chip Caps.
9 Resistors
4 Prewound chokes
1 Electrolytic Cap.
1 Pre Made Probe

★ WIRED P.C. BOARD TESTED, READY TO CONNECT TO CAN WITH PROBE & CABLE CONNECTOR ATTACHED. $24.95

We will tune converter board for $12.50
trouble shoot add 7.50
trouble shoot power supply..$12.50
plus any parts needed.

We will accept telephone orders for Visa & Mastercard
No C.O.D. Orders
TO ORDER CALL 317-291-7262
800-428-3500
Complete kit weighs 10 lbs. Please add sufficient postage
6254 LaPas Trail
Indianapolis, Indiana 46268

ELECTRONIC RAINBOW INC ✓146

GET COMPETITIVE...GET DATONG!

World's finest accessories for the serious operator

FL-3 = FL-2 + AUTO-NOTCH

That's right! What you have been asking for is here. Combining the knife-edge selectivity of the FL-2 with the unique auto-notch feature of the FL-1 has produced our most effective multi-mode audio filter ever. Double-notch capability (one manual and one auto) for when that second whistle appears.

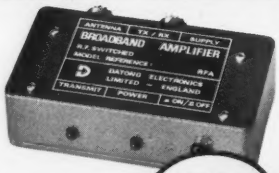
$284.95

ASP — RF SPEECH PROCESSOR

Installs in MIC line. RF clipping with speech shaping from 0 to 30 db in 6 db steps. Frequency response 400-3400 Hz ± 3 dbs. Total harmonic distortion at 1 KHz, at 30 db clip level — 1/2%. Accepts Hi or Lo impedence MICs.

$179.95

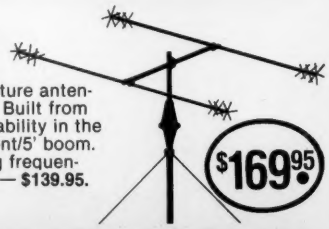
RFA—BROADBAND PREAMPLIFIER



Strengthens signal reception of any transceiver/receiver between 5 and 200 MHz. 9 db gain + low noise and 3rd order intercept of + 20 dbm. RF switched. Requires 12 dc @ 40 ma.

$74.95

"G4MH MINIBEAM ANTENNA"



High performance, miniature antenna has 6' turning radius. Built from quality materials for durability in the worst weather. 11' element/5' boom. Weighs 14 lbs. Operating frequencies: 20m, 15m, 10m. Kit — **$139.95.**

$169.95

- ALL DATONG PRODUCTS CARRY A 90 DAY WARRANTY
- VISA-MASTERCARD WELCOME

DATONG ELECTRONICS LIMITED

AR Technical Products Corp. ✓329

877 S. Adams Road
P.O. Box 62
Birmingham, MI 48012
Phone (313) 644-5698

step up to the best...

Without doubt LR-1 is the repeater value leader! Compare its outstanding performance with any repeater -- then look at its price. LR-1 features include individual die-cast shielding of receiver and transmitter plus a separately shielded 6-stage receiver prefilter for peak performance in harsh RF environments • Front panel metering of all vital functions • CW identifier • Symmetric hard limiting for clean natural audio • Low power MOS control logic • Even the cabinet is included -- just plug in and go!

NEW

LINKING? The LR-1 is also available with control circuitry for Link Transceiver operation. Now link repeater sites with the flexible control capability you've always wanted.

HIGH POWER? Our PA-75 power amplifier is the champion! Ruggedly built to give years of dependable operation in continuous duty repeater service.

NEW

Mark 3C repeaters and controllers have no equal in performance. Both units feature auto patch, reverse autopatch, autodial, 13 Morse messages and a total of 39 functions. Both feature microprocessor control and both have been proven in the field from icy Alaska to tropical Brazil. A Mark 3C supercontroller can make any repeater a super performer. The Mark 3CR repeater is in a class by itself. It combines superbly designed RF circuitry in one handsome package. It is without doubt the world's most advanced repeater!

• SEE US AT DAYTON •

CALL OR WRITE FOR FULL DETAILS

MICRO CONTROL SPECIALTIES

23 Elm Park • Groveland, Massachusetts 01834 • Telephone (617) 372-3442

49

See List of Advertisers on page 114

Unlock the New Electronic Mailboxes

MSOs are at the forefront of amateur radio's vast communications revolution. WB7QWG shows you how to tune in, log on, and not drop out.

Robert J. Foster WB7QWG/9
10126 Catalina Drive
Indianapolis IN 46236

As I sit here at my desk with pencil and eraser in hand working on this article, on the other side of the room my computer is happily keeping KB7SF (Gary—Butte, Montana) occupied in a rather active conversation on the teletype® segment of the twenty-meter band.

The computer at the moment is telling KB7SF the tale of how the English mathematician, Charles Babbage (1792–1881), might have ushered in the age of computerization with his invention of the Analytical Engine in 1835, had there not been a lack of government support.

The tantalizing details of Mr. Babbage's pursuits are just one of the information files contained in the trivia section of my Radio Shack Model III computer, acting as a host and responding automatically to user commands.

KB7SF is not the only station that has accessed the computer system this morning. In all, my mailbox contained messages from Connecticut, Florida, and Dee Why, Australia. Not bad operating for someone who has been working on projects other than amateur radio throughout the morning, with a little DX to sweeten the moment!

HAL FORMAT

```
This is the K9XYZ MSO
.EXIT—TO EXIT (MESSAGE STORAGE OPERATIONS)
.HELP—TO PRINT COMMAND LIST
1500CST / 01-AUG-82  NEXT?
```

MACROTRONICS FORMAT

```
(Command Sequence) ZW
NNNN
```

Fig. 1. Message formats.

The MSO Mystery Revealed

The age of computerization has arrived on the amateur radio bands and has found its way into mailbox, or MSO (Message Storage Option), operations. Hundreds of amateurs are discovering the convenience of sending and retrieving message traffic, computer programs, and personal greetings through the computerized systems which are located on the bands.

The questions most often heard on mailbox frequencies are, "Where are the mailboxes?" and "How do I use them?" This article will end the mystery of the command structures used by the majority of the systems and also provide a listing of mailboxes and their locations. But let's not get the cart before the horse. Before you dive into the command structures of the mailbox systems, you need to have knowledge of the equipment in use.

The Hal MSO

There are two major suppliers of mailbox systems, Hal Communications Corporation of Urbana, Illinois, and Macrotronics Incorporated of Turlock, California.

Hal offers a dedicated system (it will operate only as a teletype terminal and message system). Macrotronics offers hardware and software packages for the Radio Shack Models I and III computers as well as for the Apple II or II Plus micros which allow the computers to operate on RTTY while still allowing the computer to be used for projects other than ham radio.

The stations that are using Hal equipment are easily identified when you are listening on the RTTY band, since it is the only machine that is programmed to respond with the key letters MSO in its output. The Hal system sits passively on a frequency waiting to be activated with an access code. Normally this code is a combination of the letters MSO and the last three characters of a station callsign (e.g., the access code for K4KOZ is MSOKOZ). Once the MSO is activated, it comes alive with a distinctive message.

Note: Access code needed to activate MSO operation. Always begin commands after a carriage return/line feed (CR/LF) at far left-hand margin and preceded by a period.

.HELP Provides summary of MSO3100 commands.
.DIR MSO transmits directory of stored messages including Filename, Date, Time Created, Byte Size of messages, and Security Status.
.SDIR Gives short version of directory with name and Security Status of each stored message.
.READ Must be used in conjunction with the filename of the message you wish to read, i.e., .READ MESSAGE#1 will prompt the MSO to transmit the file entitled MESSAGE#1. You must use the exact listing for the file as written in the directory.
.WRITE Used to write a message for future storage in the MSO. Must be used in conjunction with the filename you wish to list in the directory, i.e., .WRITE MESSAGE#2 (CR/LF) THIS IS A TEST MESSAGE. would prompt the MSO to hold a message entitled MESSAGE#2 and its contents for storage.
.ENDFILE Causes message (from .WRITE above) to be stored. MSO responds with confirmation message.
NNNN Alternate End of Message Flag. File previously written will be stored, but confirmation transmission from the MSO will not be issued.
.DELETE Must be used in conjunction with filename to remove file from storage area, i.e., .DELETE MESSAGE#1 (CR/LF) will delete that file.
.FILEHELP Shows examples of command format.
.QBF MSO responds with two lines of QUICK BROWN FOX.
.RYS MSO responds with two lines of RYRY.
.EXIT Used at the end of contact with MSO to disable MSO functions. The next user will then have to open it with the access code.

Security Status of files are classified as either OPEN, READ, or PRIVATE. OPEN messages may be read or deleted by anyone. READ messages can be read by anyone but deleted only with a password. PRIVATE messages may be read or deleted only with a password.

There also are references made to special commands used for control of peripheral equipment (KY1ON, KY2OFF, etc.). These commands shouldn't be used until you know what they control. Contact the SYSOP for details, as the functions are all user defined.

There also is a command to turn the MSO printer on and off (PRINTON, PRINTOFF), which is handy to leave messages to MSO owners . . . but once again the system may or may not be set to respond to the command, so check with SYSOP first.

Table 1. MSO3100 command structure.

A command sequence is needed to access the Macrotronics systems. (See text and Table 4.) Since many of the computer systems are using "autostart" demodulators, it is suggested that all commands be preceded with a series of RYRY to open the system. A common practice is to send "RYRYRYR DE CALLSIGN (Command) (CR/LF).

TRS-80

Filenames on the TRS-80 mailbox systems are allocated by the system operator. Users can read or write only to existing mailbox filenames.

(Command Sequence)W(CR/LF) Mailbox responds with an ID format.
(Command Sequence)D(CR/LF) Mailbox responds with a listing of all mailbox message filenames.
(Command Sequence)P(Filename)(CR/LF) Transmits the filename specified in the command. Filename must be exactly as it is written on the directory.
(Command Sequence)M(Filename)(CR/LF) Opens the specified filename for insertion of message traffic. To close mailbox at end of message send NNNN.
(Command Sequence)I(CR/LF) Transmits instructions to new users.
(Command Sequence)R(CR/LF) Opens mailbox system for relay mode. Any material transmitted into the mailbox will be replayed. To end input of material for relay transmit NNNN.
(Command Sequence)C(Filename) Clears all messages stored for that filename.

APPLE A6500

There are some distinct differences between the Apple A6500 software and the rest of the Macrotronics line. The A6500 allows user stations to write their own filenames, whereas the TRS-80 systems do not.

The A6500 does not have a Relay Mode. The R command is for recording messages to the disk system, and the format is slightly different (a space between the command letter and filename).

The command letter for a directory listing is Q on the Apple system.

Finally, the A6500 command letter for deleting old message files is D and not C as in the case of the TRS-80-based systems.

(Command Sequence)W(CR/LF) Mailbox responds with ID format.
(Command Sequence)Q(CR/LF) Mailbox lists all filenames of current messages.
(Command Sequence)P(Filename)(CR/LF) Transmits specified filename as listed on directory.
(Command Sequence)R(Filename)(CR/LF) Opens system for input of filename you specified. Continue with message, ending with NNNN.
(Command Sequence)D(Filename)(CR/LF) Deletes the filename specified from the mailbox system.

Table 2. Macrotronics command structure (TRS-80 and A6500).

To identify Hal equipment, watch for a message format that looks like the one in Fig. 1. The identifiers of the Hal system are the MSO and commands that are preceded with periods.

The equipment behind that message is a Hal DS3100 ASR Communications Terminal with the MSO3100 Message Storage Option, a fairly spectacular-looking microprocessor-controlled package that operates just as good as it looks.

The DS3100 ASR was introduced in 1979 and the MSO option followed about one year later. The concept of having the MSO option was gleaned from a lot of two-meter activity around the Hal plant and just "sort of grew into the MSO," according to Bill Henry, director of Hal Communications Corporation. The MSO option has met with more popularity than he originally dreamed of, he said.

Although the DS3100 terminal has been popular in its own right, Hal has sold 400-500 of the MSO options. Some of the units, however, have been placed in commercial or government use. FCC field offices use the Hal MSO system for their internal teletype communication circuit between field offices.

The command structure for the Hal MSO was designed to follow some disk-operating systems, and according to Hal officials makes the chance of accidental triggering almost nonexistent. Learning the various commands needed for using the MSO is fairly straightforward, and a few minutes of study is all that is needed to become an expert.

Macrotronics Mailbox

Macrotronics equipment is varied and widely used, since they have been producing software/hardware packages for home computers since 1978. The earliest success, according to Ron Lodewyck N6EE, president of Macrotronics, was the M-65 interface board and software that was developed for the PET computer. Shortly afterward, units for the TRS-80 Model 1 (M-80) and for the Apple computer (A-650) were produced.

As time progressed, so did sophistication of the programs and the interface units produced by Macro-

Gaining access to the Super-Ratt-operated system is accomplished through a "log in" sequence. Normally the access code to open the system is the callsign of the host station preceded by a colon, i.e., :K1VYQ, and followed by a carriage return. Once the machine is opened, user stations are asked to "log in" with their callsign, once again preceded by the colon and followed by a carriage return which establishes commands versus "chatter."

User commands include the following:

:(TURN ON COMMAND) Normally the station callsign. Activates the bulletin-board function.

:ENTER Turns on receive-copy buffer for incoming message.

:END Sent at end of message into copy buffer. Prepares system to SAVE, CANCEL, or LIST.

:LIST Causes transmission of text stored in copy buffer.

:CANCEL If after LISTING message you wish to cancel it without SAVEing, this will remove text from copy buffer.

:SAVE Causes text in copy buffer to be written to disk, then computer asks for a filename for the directory. Filename must be preceded by a colon and followed by a carriage return (no more than 30 characters).

:READ (number) Causes message (number) from system directory to be transmitted, i.e., :READ9.

:KILL (number) Deletes a message from system.

:HELP System transmits short listing of message commands.

:COMMANDS Causes complete listing of commands to be transmitted.

:WEATHER System transmits weather file as prepared by SYSOP.

:NEWS Transmits news file as prepared by SYSOP.

:TIME Reads current time from system clock and transmits.

:DIR Sends directory of message file numbers and names.

:LOG Transmits log of system users since last log update.

:BYE Exiting code from system. Resets system to normal operating parameters.

:USER Activates special functions programmed by SYSOP. May not be in use.

:SYSOP Causes Apple speaker to "beep," alerting SYSOP of problems.

:EXPERT Bypasses longer system prompts.

:RYS System sends string of RYRYRYRY.

:QBF Causes string of QUICK BROWN FOX to be transmitted.

:ASCII Switches to ASCII mode and sends line of RYRYRY.

:BAUDOT Switches to Baudot code; sends line of RYRYRY.

:45BAUD Changes speed to 45 baud.

:74BAUD Changes speed to 74 baud.

:110BAUD Changes speed to 110 baud.

:110ASCII Places machine in 110 ASCII.

:TAPEON Activates game I/O to turn on audio tape recorder. May not be used on all systems.

:TAPEOFF Turns off tape recorder.

:C/RON Activates 72-character carriage return.

:C/OFF Turns off auto carriage-return function.

:INPUTA, :INPUTB, :INPUTC, :INPUTD If these commands are utilized, special analog data input may be transmitted from instrumentation custom-installed by individual station owners, i.e., current temperature, S-meter reading, etc. It is best to check with system operators on these commands.

Table 3. Super-Ratt command structure (Apple II).

Software	Interface	Computer
M8000	M-80	TRS-80 Model I
M8300	M-83	TRS-80 Model III
T3000	TERMINALL	TRS-80 Model III
T1000	TERMINALL	TRS-80 Model I
A6500	A650	Apple

Fig. 2. Macrotronics units.

tronics. Their latest entry on the market is the Terminall, which interfaces the TRS-80 Models I and III as well as the Apple computer to the world of amateur RTTY operation. As this article was being written, mailbox software for the Apple version of the Terminall was not available. "Not yet," Ron Lodewyck said, implying that mailbox service for Apple owners who have the Terminall is in the works.

How the original idea developed for computerized on-the-air mailboxes is a little hazy. Macrotronics is quick to admit that the idea was presented to them by an amateur radio operator who desires anonymity, and some of the base ideas for the system came from that unknown individual. (I personally thank that unknown for the concept.) Another ham who was in on the earliest stages of experimentation of mailboxes was Irv Hoff W6FFC. Although Hoff and others weren't using the Macrotronics equipment at the time, many of the operating procedures and even the current command structure for the Macrotronics mailbox systems can be traced to their early twenty-meter activities.

The interface/software packages that do support mailbox operation from Macrotronics are numerous—see Fig. 2. The A650 and A6500 combination has been discontinued by Macrotronics, but some of the units are still on the air and around flea markets. The Terminall for the Apple soon will fill the void left by the discontinuance of the A650.

Macrotronics has sold about 1000 of the mailbox systems, with the models for the TRS-80 computer outselling Apple about 2 to 1. Some of the units have found their way into commercial and government use, with NASA being listed on the Macrotronics-owners list.

Command structures for the Macrotronics systems at first seem to be a little bewildering, but with a few moments at the keyboard accessing some mailbox station, the brilliance behind the structure can be recognized. Macrotronics systems use a combination of a command sequence and letter of the alphabet to tell the computers what function is desired. The command sequence is the variable in each station's operation and is normally the last three letters of a callsign followed by the letter Z. (In my case, my call is WB7QWG and the command sequence for my mailbox is QWGZ.)

Recognizing the Macrotronics system is easy when tuning the bands. The stations invariably end each transmission with a sequence of four Ns—NNNN. This is a standard termination code for the Macrotronics-programmed computer, indicating that no further action is anticipated without another command.

Custom Cuties

In addition to the two major suppliers of mailbox systems, you will find a number of customized stations on the air. Operating systems range from home-brewed computers and CP/M-based software for business machines to Apple Basic.

Some of the stations are fascinating. I have logged a German station operating on 15 meters that called for contacts automatically, logged you in with a QSO number, and gave you an RST report—all without hands-on support from its originator! (And seemingly without the constraints of FCC rulings!)

Another computerized mailbox on 40 meters operates on ASCII, filled with Microsoft Basic programs that can be spooled into your personal computer!

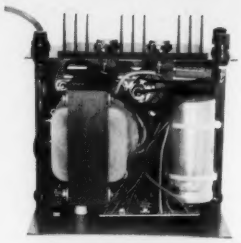
Most of the systems that have been logged here, though, follow command structures that have been in use by Hal and Macrotronics. Learning how to use

ASTRON CORPORATION
2852 Walnut Ave., Unit E
Tustin, CA 92680
(714) 832-7770

358

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



INSIDE VIEW – RS-12A

RS and VS SERIES

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output.
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-4A.
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105 - 125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W X D	Shipping Wt (lbs)
RS-4A	3	4	3¾ x 6½ x 9	5
RS-7A	5	7	3¾ x 6½ x 9	9
RS-10A	7.5	10	4 x 7½ x 10¾	11
RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46

RS-M SERIES

MODEL RS-35M

- Switchable volt and Amp meter

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12M	9	12	4½ x 8 x 9	13
RS-20M	16	20	5 x 9 x 10½	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13¾ x 11	46

VS-M SERIES

MODEL VS-20M

- Seperate Volt and Amp Meters
- Output Voltage adjustable from 2-15 volts
- Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt (lbs)
VS-20M	16	9	4	20	5 x 9 x 10½	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13¾ x 11	46

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Continous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12S	9	12	4½ x 8 x 9	13
RS-20S	16	20	5 x 9 x 10½	18

MODEL RS-7B

- Matches EF Johnson PPL Radios Available as models.

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-7B	5	7	4 x 7½ x 10¾	9
RS-10A	7.5	10	4 x 7½ x 10¾	11

*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

Callsign	State	Call-Up	Freq	Baud*	System**
KØVKH	SD	MSOVKH	14.087.7	1	3
K1VYQ	CT	:K1VYQ	14.097.5	4	1
W1CDM/6	CA	CDMZW	14.097.5	4	1
W1UKZ	MA	:W1UKZ	14.085	1	5
WA1IUF	CT	IUFZW	14.097.5	4	1
WA1URA/4	FL	:WA1URA	14.097.5	4	5
K4CZ	KY	CZZW	7098.5	1	3
K4DXR	FL	DXRZW	14.077.1	1	3
K4ILC	FL	ILCZW	14.077.1	1	1
K4KOZ	FL	MSOKOZ	14.087.7	1	3
KE4TV	??	:KE4TV	7.085	1	5
K4ZBG/6	CA	ZBGZW	14.077.1	1	1
KA4V	NC	KA4ZW	14.077.1	1	1
WB4ZQB	NC	ZQBZW	80 MTR	1	1
WD4MTC	FL	MSOMTC	14.087.7	1	3
K5FL	TX	MSO5FL	14.087.7	1	3
W5QXK	TX	MSOQXK	14.087.7	1	3
WB5NYA	OK	MSONYA	14.087.7	1	3
KA6CDC/4	KY	:KA6CDC	14.097.5	4	5
W6ZRR	CA	MSOZRR	14.087.7	1	3
WB7QWG/9	IN	QWGZW	14.097.5	4	1
K8IF	OH	IFZW	10.145	1	4
K8EWK	OH	MSOEWK	14.087.7	1	3
K8ZGZ	OH	MSOZGZ	7.083.5	1	3
WD8CEB	OH	.CEDZ	7.091.0	5	4
WB9ERE	IN	:RBBS	145.150	1	5
K9KWW	IL	MSOKUW	14.087.7	1	3
VK2BHF	DX	BHFZW	14.097.5	4	1
VK2XY	DX	2XYZW	14.097.5	4	1
ZF1GC	DX	XFGC1ZW	14.097.5	4	1

*Baud Rate:1 = 60 Baudot, 2 = 66 Baudot, 3 = 75 Baudot, 4 = 100 Baudot, and 5 = 110 ASCII.

**System: 1 = Macrotronics TRS-80, 2 = Macrotronics Apple, 3 = Hal MSO3100, 4 = Custom, and 5 = Super-Ratt.

Note: Send additions, corrections, and deletions to Robert J. Foster WB7QWG/9, 10126 Catalina Drive, Indianapolis IN 46236.

Table 4. Mailbox directory.

these two systems will make entry into the custom stations a lot easier.

Speak to Me, Computer!

Tables 1 and 2 list the command structures for the Hal and Macrotronics systems. Studying the information in the tables will ease your entry into the mailbox crowd. But some hints are in order at the same time.

Keep in mind that the mailbox frequencies will have a number of users and that someone far distant from your station that you can't hear could be accessing the mailbox. Always wait a couple of minutes before you start transmitting, since you could interrupt someone's RTTY artwork that he is depositing in a mailbox. (You don't know anger until you have "hit" some temperamental artist halfway through his ten-minute masterpiece!)

Most of the mailbox systems are crystal-controlled and depend on stable frequency for good reception and transmission. Experiment with the tuned frequency on your dial and center exactly on the host station before sending material into it.

Be sure that when you leave a mailbox system you don't leave something active that will cause heartburn for the system operator. It's considered bad form to open a mailbox and then leave it absorbing everything on the frequency and creating a two-zillion-bit message of garbage!

Keep in mind that the regulations regarding proper IDs apply. You and the mailbox must identify according to current rules.

To save time in mailbox operations, go "off line" to compose your message onto tape or disk or memory, and then return to the mailbox to send your traffic. Standing by with some hot traffic waiting for a 10-word-per-minute hunt-and-peck artist to finish with his painful pecking on a 100-word-per-minute machine can be exasperating.

There are some distinct differences that you will find going from one mailbox to another, since so many of the stations have added custom features such as baud-rate changes or switching between ASCII and Baudot. Study the basic instructions contained in the tables and then monitor mailbox operations for awhile to see the differences between one machine and another.

Where to Find Them

Mailbox systems are popping up on all of the active amateur bands, but most of the activity seems to fall on the 20- and 40-meter bands. Table 4 lists some of the stations of which I currently have knowledge. The listing falls far short of being complete, and I would like to hear from system operators whose stations aren't listed. Perhaps an update of a "mailbox directory" will be possible in a few months.

Some of the more active mailbox systems include WA1IUF (Jerry—New Haven, Connecticut) and WA1URA/4 (Frank—Miami, Florida), located on 14.097.5; there are many stations, including KØVKH (Dick—Rapid City, South Dakota), on 14.087.7; and K4CZ operates a station on 7098.5 that seems to be easily the most popular operation on 40 meters.

WA1IUF and WA1URA were among the first computerized systems on the air with the Macrotronics line in 1978. Since that time they have logged in a lot of stations that check in daily, and the frequency "network" has stretched from Europe to Australia. VK2BHF (Horst—Dee Why, Australia) is one of the newest stations to show up on that particular frequency.

The Mailbox Future

Undoubtedly not wishing to let any marketing secrets out of the bag too early, both Macrotronics and Hal were sketchy in their descriptions of future plans in the computerized mailbox area.

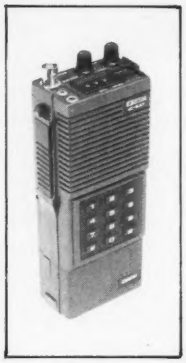
Hal responded to "What's in the future?" with the fact that they are concentrating on a new version of the MSO system that will be ideal for traffic handlers and MARS applications. The new system (Hal TRO3100) will collect and store message traffic, allow

812-422-0231

808 N. Main
Evansville, IN 47711

✓449

The HAM SHACK



ICOM-2AT

ENCOMM/SANTEC ST-144/μP

ICOM-730

TEN-TEC CORSAIR

KANTRONICS INTERFACE

AEA
CP-1 New Computer Interface....call
MBA-RO Reader....$259.00
MBA-RC Rcv/Code Conv. Xmt....385.00
MM-2 MorseMatic Ultimate Keyer....145.00
CK-2 Contest Memory Keyer....120.00
KT-2 Keyer/Trainer....95.00
BT-1 Trainer....72.00
Hot Rod Antenna....17.95

ALLIANCE
HD73 (10.7 sq. ft.) Rotator....$99.00
U-100 Small Rotator....45.00

ARRL
83 Handbook....$12.00
Antenna Book....8.00
License Manual....4.00

ASTRON
RS7A 5-7 Amp Power Supply....$49.00
RS12A 9-12 Amp Power Supply....69.00
RS20A 16-20 Amp Power Supply....89.00
RS20M 16-20 Amp w/meter....109.00
RS35A 25-35 Amp....135.00
RS35M 25-35 Amp w/meter....149.00
RS50A 37-50 Amp w/meter....199.00
RS50M 37-50 Amp w/meter....225.00

AZDEN
PCS 4000 2M Xcvr....$289.00
PCS 300 Handheld....285.00

B&W
Folded Dipole 80-10 Meter
Only 90' Long, No Tuner Necessary $135

BASH
Books and Tapes....$9.95

BENCHER
BY-1 Paddle....$36.00
BY-2 Chrome Paddle....45.00

BUTTERNUT
HF6V 80-10 Meter vertical....$119.00
RM Kit Roof Mount w/radials....39.00
STR Stub Tuned Radials....23.00
TBR 160 Meter Coil Kit....49.00

CUSHCRAFT
A3 Tribander 3 EL....$179.00
A4 Tribander 4 EL....229.00
A743/744 40 Meter Add-on....69.00
R3 Motor Tuned Vertical....229.00
AV5 80-10 Meter Vertical....95.00
214B Boomer 14 EL 2M....69.00
214FB Boomer 14 EL FM....69.00
228FB Power Pack 28 EL 2M FM....189.00
32-19 Super Boomer 19 EL 2M....83.00
220B Boomer 17EL 220 MHz....75.00
ARX-2B Ringo Ranger II 2M....36.00

DAIWA
CNA-1001 0.5KW Antenna Tuner....$299.00
CN 520 1.8-60 MHz SWR/Pwr Mtr....63.00
CN-620B 1.8-150 MHz SWR/Pwr Mtr....110.00
CN-630 140-450 MHz SWR/Pwr Mtr....129.00
CS-201 2-position switch....22.00
CS-401 4-position switch....62.00

DRAKE
TR7A Xcvr....$1,435.00
R7A Receiver....1,390.00
TR5 Xcvr....695.00

ENCOMM (SANTEC)
ST-144/μP The Hand Held Offering the Most Features
Call for Your Discount Price!

HAL
DS3100/MPT/ST6000....$2,825.00
CT2100/KB2100....829.00
RS2100 Scope....269.00

HY-GAIN
TH7 DXS 7EL Tribander....$369.00
TH5 MK2S 5EL Tribander....319.00
TH3 MK3S 3 EL Tribander....219.00
402BAS 2EL 40 Meter Beam....199.00
66BS 6EL 6 Meter Beam....109.00
18HTS 80-10 Meter Vertical....339.00
V2S 2 Meter Vertical....39.00
5/8 Wave 2M Mag Mt....20.00
CD45 8.5 sq. ft. Rotator....105.00
Ham IV 15 sq. ft. Rotator....195.00
T2X 20 sq. ft. Rotator....249.00
HDR300 25 sq. ft. Rotator....435.00
Free Shipping on all crank-up towers

ICOM
We Have All the Great ICOM Transceivers in Stock
720A, 740, 730. Call Today for Your Discount Price!
IC-2AT....Now Only $215!
3AT/4AT Handhelds....$235.00
25A new display & mic....305.00
290H 2M All Mode....479.00
251A 2M All Mode....575.00
45A 440 MHz....349.00

505 6M Xcvr....395.00
R70 Superb Receiver....599.00

KLM
KT34A 4EL Triband Beam....$299.00
KT34XA 6 EL Triband Beam....459.00
144-148-13LBA 2M Long Boomer....79.00
143-150-14C 2M Oscar Ant....85.00

KANTRONICS
The Fantastic Interface for CW, RTTY, ASCII Only $165!

LARSEN
NLA-150-MM 5/8 Wave 2M Mag. Mt....$39.00

MFJ
989 3KW Roller Inductor Tuner....$280.00
949B Tuner....125.00
941C Tuner....81.00
940B Tuner....72.00
901 Tuner....54.00
900 Tuner....45.00
401 Econokeyer....45.00
496 Super Keyboard....269.00
422 Keyer/BENCHER Paddle combo....89.00
722 Filter w/notch....63.00
250 Dummy Load w/coil....32.00
812 VHF Meter....29.00
816 HF Meter....29.00
1040 Deluxe Preselector....89.00
104 New Dual 24hr Clock....29.00
313 VHF Conv for HT....36.00

MIRAGE
B23 2/30 Amp....$80.00
B108....155.00
B1016....239.00
B3016....205.00
D1010 10/160 440 MHz....275.00
MP1/MP2 Watt Meters....100.00
C106 220 MHz....169.00
C22 220 MHz....80.00

ROHN
25G....$42.00

SHURE
444D Desk Mic....$50.00
414A Hand Mic....36.00

TEN-TEC
Corsair....$999!
525 Argosy....$469.00
227 Antenna Tuner....80.00
229 2KW Tuner....250.00

TOKYO HY-POWER
HL30V 25W Amp....$63.00
HL160V 160W Amp....289.00
HC2000 2KW Tuner....289.00

UNADILLA
W2AU Balun....$16.50
150' 14 gauge stranded wire....15.00
Insulator....3.00/pr.

VOCOM
Amplifiers/Antennas....call

Prices and Availability Subject to Change

Send SASE for our new & used equipment list.

MON-FRI 9AM-6PM • SAT 9AM-3PM

✓See List of Advertisers on page 114

easy editing of the messages, allow rearranging of the messages in whatever priority is needed, and then transmit them.

Macrotronics evidently has a number of irons in the fire, but as Ron Lodewyck pointed out, the development time for the software is enormous. Approximately two man-years of time was devoted to the original M8000 program, so future editions of the mailbox and RTTY programs for computers will take awhile.

One interesting note from Macrotronics was a reference to the Atari 800 and 400 computers and the fact that they seem to be the cleanest computers from an RFI standpoint; progress is being made for software for those computers.

The future of RTTY and new modes of error-free communication also were discussed. AMTOR and Packet Radio undoubtedly will find their way into mailbox/MSO systems and general data transmission.

While those companies that have been providing systems in the past continue to upgrade and market their mailbox systems, new entries are being made in the amateur radio market. Universal Software Systems, Inc., of Ridgefield, Connecticut, just released the Super-Ratt program for the Apple computer which is causing some heads to turn on the mailbox frequencies.

Not a package system, Super-Ratt is the software to drive an Apple II with 48K of RAM, Applesoft Basic in RAM, and at least one disk drive. The Radcom RTTY card is supported, or some other type of TTL-compatible terminal unit may be used through the Apple game I/O.

Super-Ratt combines most of the desirable features found in older systems with some new functions found only in the Ratt-Soft program. What kind of features? You name it! How about automatically including the temperature and humidity conditions around the shack location? Analog-input capability of the Super-Ratt leaves your imagination to devise new functions. In all, some 33 commands are available in the Super-Ratt bulletin-board mode, with other routines available to the system user (see Table 3).

A very unique feature of the program allows error-free file transfers between two Super-Ratt stations. After being placed in the transfer mode, the two station's begin transferring data, with the receiving station's computer verifying line-oriented check sums of each line, acknowledging error-free reception, or requesting a repeat of the material. The two computers "handshake" the file being transmitted until it is finally received error-free.

Although the Super-Ratt is currently available only for the Apple computer, Bill Barrett of Universal Software reports that software for the Commodore 64 and TRS-80 Models I and III will be available in a few months.

I see a trend toward specialized mailbox systems springing up across the country. As with computer bulletin boards accessed through telephone lines, people with specific interests can start exchanging ideas on ham-radio mailbox systems. In fact, I have a healthy interest in the TRS-80 and mailbox systems. As a starter, let's list my mailbox on 14.097.5 as the "Mailbox-Mailbox."

Will be looking for you on twenty meters! ■

SUPER-RATT™

The Complete RTTY Communications Program for the Apple II

ONLY $59.95 POSTPAID!

- Full Radio Bulletin Board System™
- Verified File Transfer™ assures error-free communication
- Works with all conventional tuning units
- 75 pages of documentation
- "Open" Program—easy for you to modify

and much, much more! For all of the details, contact:

UNIVERSAL SOFTWARE SYSTEMS, INC.
9 SHIELDS LANE · RIDGEFIELD, CT 06877
(203) 438-3117 VISA/M.C. OK

189

1982-1983
AMATEUR RADIO
CALL DIRECTORY©

THE BARGAIN AT $14.95 Plus Shipping

A no frills directory of over 411,000 U.S. Radio Amateurs. 8½x11, easy to read format. Completely updated.

Also available for the first time ever—
(Alphabetically arranged—Sold separately)
Geographical Index
by State, City and Street No. and Call
Name Index
by Name and Call

Ordering Information:
- **Directory—$14.95**
- **Geographical Index—$25.00**
- **Name Index—$25.00**

Add $3.00 Shipping to all orders.

Dealers/Clubs inquiries welcome
Send your order—enclosing check or money order in U.S. dollars to:

Buckmaster Publishing
70-J Florida Hill Road
Ridgefield, CT 06877 U.S.A.

226

IRON POWDER and FERRITE PRODUCTS

AMIDON Associates ↙334

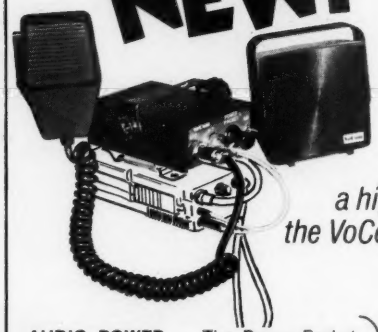
Fast, Reliable Service Since 1963

Small Orders Welcome **Free 'Tech-Data' Flyer**

Toroidal Cores, Shielding Beads, Shielded Coil Forms
Ferrite Rods, Pot Cores, Baluns, Etc.

12033 OTSEGO STREET, NORTH HOLLYWOOD, CALIFORNIA 91607

NEW!



Hand-Held to MOBILE and back again!

Convert ANY hand-held into a high-power mobile radio using the VoCom POWER PACKET™ system

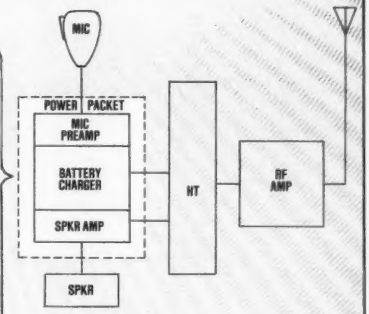
AUDIO POWER — The Power Packet provides an amplified 2½ watt output so that messages can be heard above road noise, even with the windows down. Use with your vehicle speaker, or with optional Packet Speaker.

CHARGE POWER — Charge is supplied at a 35 mA rate which will maintain battery level during receive. With radio off, it provides a complete charge in 10 to 14 hours.

ADDED CHARGE POWER — When the Power Packet is keyed during transmit, its charger supplies 300 to 400 mA to help maintain the radio's battery while in the transmit mode. With the radio off, this feature can be used to provide a quick charge for emergency needs.

MIC PREAMP — With the Power Packet's adjustable mic preamp, your hand-held is compatible with almost any standard mobile microphone. Choose your favorite or the optional Packet Mic.

MORE FEATURES — The tiny Power Packet comes with a handy bracket that will hold any make or model of hand-held radio by the radio's belt clip. The Power Packet also features a hooded light to show up the radio's top controls in the dark.



Power Packet $84.95
(Includes Audio Power, Charge Power, Added Charge Power, Mic Preamp, HT-Mounting Bracket, and Hooded Light)

RF Power
25W (2C025-2) ..... $ 84.95
50W (2C050-2) $124.95
100W (2C100-2) $199.95

Packet Speaker ..... $ 19.95

Packet Mic ..... $ 24.95

HT Interface Kits ..... from $9.95
(state make, model)

Prices are suggested retail. See your favorite amateur radio dealer.

TO ADD RF POWER

For 25, 50, or even 100 watts of mobile talk-out power, plug the output of your hand-held into your choice of VoCom's line of wideband RF amplifiers — or use your own.

Now your hand-held radio has been turned into a full-fledged mobile radio. And it's a simple matter to return — all charged and ready — to hand-held operation.

↙90 **VoCom**
PRODUCTS CORPORATION
65 E. Palatine Rd., Prospect Heights, IL 60070
(312) 459-3680

Power Packet and VoCom are trademarks of VoCom Products Corporation. © 1983 by VoCom Products Corporation.

↙See List of Advertisers on page 114

WHY COMPRO-MISE

Others claim more gain for their antennas than the IsoPole™ antennas, but none can beat the IsoPole for HONEST on-the-horizon omni-directional gain unless you are willing to spend at least THREE TIMES AS MUCH!!! The IsoPole is easiest of ALL competitive models to assemble, has a weather protected, factory-tuned matching network, (no more aggravating SWR variations with weather changes), uses all stainless steel hardware, and is designed to withstand severe icing and wind conditions. The IsoPole antenna is UPS shippable without the standard 10 foot 1¼ inch TV mast. You can buy the mast from your local ham dealer, hardware store, or Radio Shack™ store for less than the shipping costs of a single mast. When good strong, low cost 10 foot sections of mast are so easily available, why compromise by using several shorter pieces that have to be joined together?

Prices and Specifications subject to change without notice or obligation.

JUN'S ELECTRONICS

3919 Sepulveda Blvd.
Culver City, CA 90230
(213) 390-8003/1-800-882-1343

AEA Brings you the Breakthrough!

How E.T. Really Called Home

If it were not for an inventive ham, E.T. might still be trying. In this exclusive article, the designer of the little guy's communicator unveils its inner workings.

Henry R. Feinberg K2SSQ
415E 85th Street
New York NY 10028

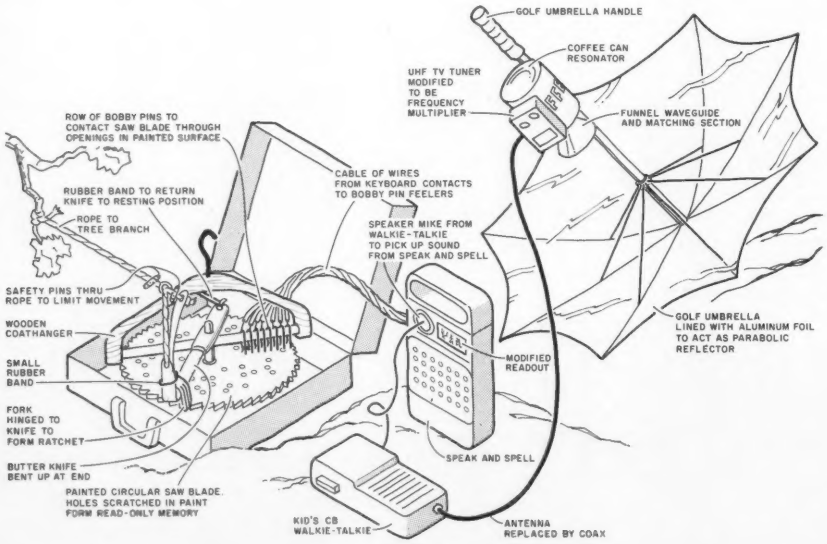
"TGIF," I thought as I returned from lunch to my office in the exhibit department of Bell Labs. Lying on top of my desk—on top of a pile of exhibit plans—was a telephone message asking me to call Kathleen Kennedy in Hollywood. Now, the public relations department of Bell Labs gets many requests for information, but this one was considerably more unusual than most.

Ms. Kennedy, who produced *E.T.* with Steven Spielberg, had called Bell Labs earlier that day to find someone who would work at home during the weekend, designing a space communicator to be used by a stranded alien to contact his space ship. Few other details were given, as a great deal of secrecy surrounded the film. Even the name of the film was a secret. I was told that the alien was called E.T., short for extra-terrestrial, but the working title given me for the film was deceiving; it was called "A Boy's Life."

I guess the call was referred to me because of my experience in using household objects to explain science. My title at Bell Labs at the time was Exhibits and Science Presentations Coordinator. Before coming to the Bell system, I worked with Don Herbert, TV's "Mr. Wizard," designing experiments using everyday materials to explain scientific principles. At the Labs, I continued my work popularizing science through films, demonstrations, and exhibits. Currently, my work at AT&T involves corporate exhibitions such as the Bell System's Futurecom at Epcot Center in Walt Disney World.

Kathleen Kennedy asked me to work by phone with Melissa Mathison, who was writing the *E.T.* script and who was also associate producer. I had several long phone calls with Melissa, discussing items found around the house that could be used in a communicator. As an avid ham-radio operator with a limited junk box, I first looked for household objects that could actually transmit a signal. Transmitters of various sorts were too ordinary, of course. I was looking for something more exotic, something like a microwave oven that could be converted to send a signal into space.

Plausibility was a big fac-


GOLF UMBRELLA HANDLE
COFFEE CAN RESONATOR
UHF TV TUNER MODIFIED TO BE FREQUENCY MULTIPLIER
FUNNEL WAVEGUIDE AND MATCHING SECTION
ROW OF BOBBY PINS TO CONTACT SAW BLADE THROUGH OPENINGS IN PAINTED SURFACE
CABLE OF WIRES FROM KEYBOARD CONTACTS TO BOBBY PIN FEELERS
RUBBER BAND TO RETURN KNIFE TO RESTING POSITION
ROPE TO TREE BRANCH
SPEAKER MIKE FROM WALKIE-TALKIE TO PICK UP SOUND FROM SPEAK AND SPELL
SAFETY PINS THRU ROPE TO LIMIT MOVEMENT
WOODEN COATHANGER
SMALL RUBBER BAND
FORK HINGED TO KNIFE TO FORM RATCHET
BUTTER KNIFE BENT UP AT END
PAINTED CIRCULAR SAW BLADE. HOLES SCRATCHED IN PAINT FORM READ-ONLY MEMORY
KID'S CB WALKIE-TALKIE
ANTENNA REPLACED BY COAX
SPEAK AND SPELL
MODIFIED READOUT
GOLF UMBRELLA LINED WITH ALUMINUM FOIL TO ACT AS PARABOLIC REFLECTOR

Pictorial drawing of the E.T. communicator.

tor. While the communicator didn't actually have to work, I wanted it to be plausible enough that my ham friends at Bell Labs wouldn't laugh me away from the "ham table" in the cafeteria. I also wanted to avoid a science-fiction look with a lot of blinking lights, coils, and sparks. It was important to me that people seeing the film would not be scared away from the science, and might even understand how a communicator like this might work.

Using a microwave oven as a transmitter seemed plausible enough, and I expanded on the fanciful design by placing a round hubcap in the oven to focus the microwave energy out the door and into a waveguide made of flexible aluminized air-conditioning duct. The duct could be run out the kitchen window to an antenna made by inverting a metal patio umbrella and using it as a parabolic reflector.

At this point, before I'm accused of gross ignorance for failing to recognize how the oven would be de-tuned or how inefficient the system would be, remember that the objective was plausibility, not practicality. It was the thought that counted, and I was having fun thinking of possibilities such as building a flying spot-scanner using a combination of mechanical and electronic components—like Christmas tree ornaments and loudspeakers with mirrors attached. Melissa Mathison told me that Steven Spielberg liked the microwave oven idea but wanted a portable unit to work from a forest clearing. Back to the drawing board.

During my years with Mr. Wizard, we put together one Rube Goldberg contraption after another to illustrate scientific principles. Invariably, we would use household materials in unorthodox ways. Psychologists call this type of creative brainstorming a release from "functional fixedness." Briefly stated, it means that you can do more with an old 813 than build a lamp with it. The trick is to analyze the desired result by function, breaking down each section to as simple a scale as possible; then it's easier to build the unit from the ground up in a new way. (Sounds a lot like writing a computer program, doesn't it?)

The E.T. communicator. (Photo copyright © 1982, Henry R. Feinberg)

What Spielberg wanted was a beacon transmitter—something to say "Here I am! Come and get me!" I reasoned that three main parts were needed for a basic beacon: a means of producing a message, a programmer to repeat the message, and a way of transmitting the signal into outer space.

Working backward, I knew that a golf umbrella lined with aluminum foil would make a plausible-looking parabolic reflector. And on my last trip to the Dayton Hamvention, I saw coffee cans being used as resonators for receiving MDS TV signals. In fact, a UHF TV tuner purchased there *could* be extensively modified to act as a multiplier to select the umpteenth harmonic of a CB signal from a toy handie-talkie. The resulting microwave signal *could* then be directed from the coffee-can resonator toward the umbrella reflector through a waveguide/matching section made from a funnel. Ah, the license of plausibility!

To produce the message, I used a Speak and Spell™ learning aid made by Texas Instruments. The unit contains a speech synthesizer, a keyboard, a flourescent readout, and a speaker. E.T. deserved his own alphabet, so I rewired the segments of the alphanumeric readout. It took several tries to make the resulting gibberish look like another language. No changes were made in the speech circuits since I thought the sound-effects people would add their own sound. Actually, they never did, and in the film one doesn't hear any sound at all from the communicator—not even the original "message" I devised with the help of Debbie, my wife. It was our names repeated over and over.

The remaining problem was how to program the Speak and Spell to repeat the same message over and over. To begin with, wires were attached to each keyboard contact. A set of feelers was needed for the other end of the wires. Originally, I used a row of safety pins inserted through the dowel of a wooden coat hanger. But these were a problem to keep straight under pressure. Debbie deserves the credit for suggesting bobby pins. Their flat cross-section prevented them from moving sideways.

The coat hanger was positioned across a child's record player. On the turntable, a circular metal saw blade took the place of a record. The surface of the saw blade was coated with several layers of spray paint which served as insulation, preventing the bobby pins from contacting the metal blade. The message was programmed on the blade by carefully scratching through the paint. This created a pattern of openings similar to those on a punched card through which selected sets of bobby pins could make contact with the blade as it turned.

But how to turn the saw blade? Well, since the com-

ICOM-KENWOOD OWNERS!!
See the NOVAX in Dayton

at the

USERS INTERNATIONAL RADIO CLUB BOOTH

- U.I.R.C. — an information exchange for ICOM & KENWOOD users (Newsletter subscriptions available)
- U.I.R.C. endorses selected amateur equipment
- See the NOVAX line of Simplex Auto Connects — Show Specials!

We're looking forward to seeing you!!

Rob **Rich** **Sharon** **Tony**

CURRENT DEVELOPMENT CORPORATION

Box 162 - Tudman Rd.
Westmoreland, N.Y. 13490
or Phone 315-829-2785

(formerly R.W.D. Inc.)

232

municator was to work by itself in the forest and saw blades have teeth, I decided to use wind power to rotate the blade via a ratchet mechanism. A knife and fork were hinged together and made to pivot on the spindle of the turntable. Each back-and-forth motion of the knife and fork pulled another tooth of the saw blade around and created another set of contacts. A rubber band returned the knife between pulls. A string tied between the knife and a nearby tree branch was all that was needed—the rest was a breeze!

How were the electronics powered? As Melissa Mathison rationalized it, E.T. came from an agrarian society that had learned to tap the forest for electrical power. On the set, the day's shooting schedule didn't leave time to wire the trees, so a battery was used. Score one for practicality over plausibility.

The close-ups of the communicator were filmed in a sound stage dressed to look like the forest. To achieve a misty quality, the trees were sprayed with water before each take. Everything was damp, including the boulder on which E.T. placed the Speak and Spell. At one point, the bare circuit board made contact with the wet surface and it stopped working. Panicked thoughts of zapped ICs flashed through my mind as all eyes turned to me for help. I was scared, but I said a silent prayer and asked for a hair dryer to be brought onto the set.

There's a scene in the film where Elliott helps E.T. set up the communicator in the forest. As the wind starts to blow, Elliott shouts, "It's working! It's working!" I remember that scene, because I was standing right next to the camera, wiping my brow and mouthing the same words. ■

THE ANTENNA BANK

6460H General Green Way
Alexandria, Virginia 22312
703-569-1200
All prices subject to change without notice

Hy-Gain Antennas

TH7DXS 7 element triband beam	$ 376.00
TH5MK2S 5 element triband beam	309.00
TH3MK3S 3 element triband beam	215.00
TH3JrS 750W PEP 3 el tribander	156.00
TH2MK3S 2 element triband beam	134.00
TH6 to TH7DXS conversion Kit	135.00
205BAS 20m 5 element "Long John"	292.00
155BAS 15m 5 element "Long John"	175.00
105BAS 10m 5 element "Long John"	114.00
18AVT/WBS 80-10m trap vertical	87.50
14AVQ/WBS 40-10m trap vertical	51.00
V2S 2m colinear gain vertical	37.50
BN-86S Beam mount 1:1 balun	17.00

Full line available at big savings!

Hy-Gain Crank-up Towers

HG-33HT2 Side supported	$ 744.00
HG-35HT2 Side supported	546.00
HG-50HT2 Side supported	754.00
HG-37SS Self-supporting	642.00
HG-52SS Self-supporting	923.00
HG-54HD Self-supporting	1500.00
HG-70HD Self-supporting	2351.00

Crankups freight prepaid in continental US

Hustler

5BTV 80-10m vertical	$ 100.00
4BTV 40-10m vertical	79.00
G7-144 2m colinear vertical	99.00
G6-144B 2m colinear vertical	68.00
MO-1,2 HF mobile masts	18.50
RM-10 10m resonator	9.00
RM-15 15m resonator	9.00
RM-20 20m resonator	12.00
RM-40 40m resonator	13.75
RM-75 75m resonator	14.75
RM-80 80m resonator	14.75
BM-1 Bumper mount	13.00
SSM-2 S.S. ball mount	14.00
HOT "Hustloff" mount	14.00
SF-2 2m 5/8 mobile whip	9.00

Entire line at super savings!

Rohn Towers

20G 10 ft section	$ 29.50
20AGO top section	32.75
25G 10 ft section	41.00
25AGO top section	53.50
45G 10 ft section	93.75
45AGO top section	104.75
BX48 6 sq ft max	204.00
HBX48 10 sq ft max	253.00
HDBX48 18 sq ft max	316.00
FK2548 48 ft foldover	794.00
FK4544 44 ft foldover	1117.00

Diawa/Miller

CS-201 2 way coax switch	$ 20.00
CS-401 4 way coax switch	62.00
CN-520 HF SWR/Power meter	59.00
CN-540 VHF SWR/Power meter	69.00
CN-550 UHF SWR/Power meter	76.00
CN-620B HF/VHF SWR/Power meter	107.00
CN-720B HF/VHF SWR/Power meter	150.00
CNW-418 auto tuner/meter	168.00
CNW-518 auto tuner/meter	205.00

Mini-Products

HQ-1 "Mini-Quad" 6,10,15,20m	$ 129.95
B-24 "Mini-Beam" 6,10,15,20m	99.00
RK-3 3rd element for B-24	67.00

ORDERS ONLY: 800-336-8473
ALL others call: (703) 569-1200
No COD - We ship UPS
Allow two weeks for delivery
Shipping cost not included
We reserve the right to limit quantities
We gladly except VISA and MASTERCARD

Cushcraft Antennas

A4 4 element triband beam	$ 224.50
A3 3 element triband beam	172.50
R3 Gain triband vertical	224.50
AV5 80-10m trap vertical	88.50
AV4 40-10m trap vertical	81.50
AV3 20-10m trap vertical	44.20
32-19 19 element 2m "Boomer"	81.50
214B 14 element 2m "Jr Boomer"	68.00
214FB 14 element FM "Jr Boomer"	68.00
A147-11 11 element 2m beam	37.50
A144-10T 10 element 2m twist beam	44.20

Full line available at great savings!

Rotors

HDR-300 Digital readout 25 sq ft	$ 427.00
T2X "Tailtwister" 20 sq ft	244.00
HAM-IV 15/7.5 sq ft	195.00
CD-45 8.5/5 sq ft	102.75
AR-22XL 3/1.5 sq ft	49.95
HD-73 Dual speed 10.7 sq ft	89.00
U-100 Approx. 3 sq ft	42.00
8 cond rotor cable	.16/ft
6 cond rotor cable	.15/ft
4 cond rotor cable	.075/ft

MFJ Enterprises

MFJ-900 200 Watt Versa Tuner	$ 41.95
MFJ-941C 300 watt Versa Tuner II	77.55
MFJ-949B 300 watt Versa Tuner II	117.55
MFJ-962 1500 watt Versa Tuner III	193.15

Other MFJ products at similar savings!

Coax and Wire

RG-213/u Milspec 95% shield	.28/ft
RG-8/u "Superflex" foam	.24/ft
Mini-8 foam	.12/ft
RG-58/u "Superflex" foam	.12/ft
#14 standed copper 50,75,100,or 150 ft	.05/ft
#14 copperweld 50 ft multiples	.075/ft

Introducing The SRT-3000 RTTY Communications Send-Receive Terminal

SRT-3000
List
$995.00

• Built-in demodulator & AFSK modulator for 170,425,850 Hz shifts, high and low tone pairs • 60,66,75,100,132 WPM Baudot, 110,300 Baud ASCII, 5-99 WPM Morse • 1000 character text buffer with BREAK feature • Ten 80 character message memories with battery backup • Selectable display formats, 24 lines x 72 characters (2 pages), 24 lines x 36 characters (4 pages), 16 lines x 36 characters (6 pages) • Split screen operation • On screen status line displays a tuning bar, mode, speed, shift, tone pair, normal/reverse, USOS, WRU, SELCAL, buffer mode and buffer count • Cassette interface for long "Brag Tapes" or unattended message storage • Baudot and ASCII printer outputs • Built-in audio monitor • Built-in 110 VAC power supply • Other features—PTT control, WRU, SELCAL, sync idle, CW ID, USOS, auto-start, full or half duplex, scope outputs, weight control, intercharacter spacing, reverse video, RS-232, word wrap around • Compact size only 13.3 x 10.3 x 4 inches • Made in USA.

Optional 9" video monitor shown $149.00.

Send For Free Information

DGM ELECTRONICS, INC.
787 Briar Lane, Beloit, Wis. 53511
(608) 362-0410

Introducing our Latest Model — NOVAX II
Inquire about our spring sale!

SIMPLEX / DUPLEX
AUTOPATCH

NOVAX I
NOVAX II

NOW TWO MODELS TO SERVE YOU BETTER
YOUR OWN PRIVATE AUTOPATCH

NOVAX
MOBILE CONNECTION

NOVAX interfaces your standard 2 meter; 220; 450; etc. Base station and telephone, using a high speed scan switching technique so that you can direct dial from your automobile or with your HT from the backyard or poolside — Automatically ... Easy installation transceivers, featuring solid state switching, offer best results ... Available interfaced with an ICOM 22U.

FEATURES	NOVAX I	NOVAX II
• 3 min. Call duration timer	YES	YES
• Up to 45 sec. activity timer	YES	YES
• Single digit Access Control	YES	NO
• DTMF (Touch Tone)* phone connection	YES	YES
• 4 digit Access Control	NO	YES
• Toll Restrict	NO	YES
• LED Digital Display	NO	YES
• Vinyl covered alum. case size	5" x 6" x 2"	10" x 8" x 1¾"
• Directly Interfaces with Repeater	NO	YES
• Rotary Dial System (incl. Last digit dial)	NO	YES—"Option"—$49.95
• Ring Back (reverse autopatch) "Option"	YES—$39.95; Kit $29.95	YES—Wired—$39.95
• Price	Kit:$169.95/wired $219.95	Wired only $279.95
N.Y.S. Res. add appro. Sales Tax	SHIPPING ADD $3.50 in U.S.A.	

* Trademark ITT

✓21 To order, send check, money order to: MASTER CHARGE AND VISA ACCEPTED

CURRENT DEVELOPMENT CORPORATION (formerly R.W.D. Inc.)

Box 162 - Tudman Rd.
Westmoreland, N.Y. 13490
or Phone 315-829-2785

ASSOCIATED RADIO 913-381-5900

8012 CONSER BOX 4327
OVERLAND PARK, KANSAS 66204

BUY—SELL—TRADE

All Brands New & Reconditioned

YOU WANT A DEAL — WE WANT TO DEAL
CALL NOW!!!

MasterCard VISA

SAVE—SAVE—SAVE

NOTE: SEND $1.00 FOR OUR CURRENT CATALOG OF NEW AND RECONDITIONED EQUIPMENT
SEND $1.00 FOR OUR WHOLESALE LIST OF UNSERVICED & OVERSTOCK ITEMS.
SEND $2.00 FOR BOTH. THEY WILL BE MAILED SEPARATELY.

✓See List of Advertisers on page 114

John Wood WA4BPI
1101 Little Elton Lane
West Memphis AR 72301

Buyer's Guide to Dayton

From securing accommodations to planning your expenses, WA4BPI helps you make the most of your Hamvention buck.

Is this great hobby called ham radio starting to get you down? Maybe you've had your fill of QRM and the woodpecker and you're ready to swap your low-band rig for a set of golf clubs?

Don't worry. It's not the end of the amateur radio world for you. It's something we all go through at one time or another. It's just a time to find a new phase of the hobby to jump-start your interest in ham radio again. And the biggest pulse of charging current in ham radio is just around the corner—on April 29, 30, and May 1, the dates for the 1983 Dayton Hamvention.

First, let me say that I don't have any ulterior motives for writing this article. I don't live in Dayton, Ohio, I'm not a member of the Dayton Chamber of Commerce or of the Dayton Amateur Radio Association, I don't have a vested interest in the Dayton Hamvention, and I don't even have relatives living in Dayton. I just love their hamfest and look forward to it every year. The purpose of this article is simply to pass along some of the things I've learned after attending the Hamvention many times. Hopefully, what I've learned can help you improve your annual trip to Dayton (if you've been before) or, if you've never been, to encourage you to attend and get in on the fun.

Transportation and Accommodations

Most years that I've attended the Dayton Hamvention, I've traveled in private vehicles, but many others fly (it's almost 500 miles from where I live) and still others, I imagine, have taken the train.

The first year we traveled in a Winnebago and, as nice as that was, there were a few drawbacks. The RV route can be troublesome, depending on the size of the group and the people that make up the group. If you've been on trips before with the folks and get along well, the chances are that you'll enjoy a trip to Dayton with them in the RV. But even a husband and wife have arguments, so it's best to make sure you have a congenial group since you'll be sharing some close quarters for a few days and nights.

RVs are also a problem in that unless you have a second vehicle you have to unpack everything when you get to camp and hook up water and electricity, and then repack and unhook everything to drive to the Hamvention. Driving the RV and finding a place for it at the Hamvention parking lot also can be a grueling situation even with the help of the many courteous parking lot attendants. A car is a lot easier to maneuver in tight spaces.

I've also stayed in a pop-up camper, and even though it was economical, the weather at Dayton in April is changeable; the weekend we camped out, the overnight temperatures dipped to the 30s and it was very uncomfortable sleeping in the cold.

With experience as my teacher, I've found that the best way to make the trip is to drive a car, stay at a motel, and share the car and room costs with two or three fellow hams. The Hamvention Housing Bureau can be a big help in locating suitable accommodations, so avail yourself of their services. A total of 38 hotels, motels, and inns work with the bureau to help you find a place to stay, so you have a wide selection of rooms and prices. But the Bureau works on a first-come, first-served basis and it's best to get your reservations in early. If you insist on waiting until the last minute, the deadline for reservation requests is April 1.

Why go the motel route if camping is cheaper? The

Icom promoted its concept of "The World System" with its exhibit at the '82 Dayton Hamvention. It was one of the largest exhibits among the 180 dealers with displays.

Alaska Microwave Labs

P.O. BOX 2049 PALMER, ALASKA 99645
(907) 376-3098 DEPT 73

GaAs FETS

MGF1400 NF 2.0DB @ 4GHZ MAG 15DB	$14.00
MGF1412 NF 0.8DB @ 4GHZ MAG 18DB	$50.00
MCF1200 NF 1.0DB @ 1GHZ, NF 2.2DB & MAG 14DB @ 4GHZ	$11.00

VTO

V72T-1 2.7GHZ TO 3.2GHZ MIN POWER OUT 10 MW TUNING VOLTAGE 0 TO 20V Vcc +15 vdc at 60 MA	$98.00
V72T-2 2.8GHZ TO 3.3GHZ REST SAME AS V72T-1	$98.00
V82T-1 SAME AS V72T-1 BUT FREQ 3.0GHZ TO 3.5GHZ	$98.00
V82T-2 SAME AS V72T-1 BUT FREQ 3.6GHZ TO 4.2GHZ	$98.00
V82T-3 SAME AS V72T-1 BUT FREQ 4.0GHZ TO 4.5GHZ	$98.00
V92T-1 SAME AS V72T-1 BUT FREQ 4.5GHZ TO 5.0GHZ	$98.00
V56T-1 .9GHZ TO 1.6GHZ POWER OUT 13 MW TUNING VOLTAGE 2 TO 50V Vcc +15 VDC AT 60 MA	$98.00
V66T-1 SAME AS V56T-1 BUT FREQ 1.5GHZ TO 2.5GHZ	$98.00

CHIP CAPACITORS

1.2, 2.2, 2.7, 3.3, 4.7, 6.8, 10, 18, 22, 27, 47, 100, 120, 180, 220, 270, 330, 390, 470, 560, 680, 820, 1K, 1.2K, 1.8K, 3.9K, 8.2K, 10K, 100K	$.60

PISTON TRIMMERS

TRIKO 201-01M	
.3-1.8PF	$2.50
.5-3 PF	$2.50
1-8 PF	$2.50

TEFLON CIRCUIT BOARD DBL SIDED 1 OZ

APPROX. 3.25"× 5.0"× .010	$5.50
APPROX. 3.25"× 5.0"× .0312	$6.50
APPROX. 3.25"× 5.0"× .0625	$10.50

MIXERS

3.7GHZ TO 4.2GHZ MIXER, LO 2.8GHZ TO 5.1GHZ, IF DC-.9GHZ SSB CONVERSION LOSS TYP 5.5DB MAX 6.5DB, TO-8 PACKAGE	$55.00
.9GHZ TO 1.3GHZ MIXER, LO .7GHZ TO 1.5GHZ, IF DC-.2GHZ SSB CONVERSION LOSS TYPE 7.0DB, TO-8 PACKAGE	$15.00

CHIP RESISTORS

50 OHM ½ WATT	$1.50
3 1% CHIP RESISTORS FOR: 50 OHM T NETWORK 3 DB PAD	$6.00

NO WARRANTEE ON SEMICONDUCTORS

OPEN AT 8 PM EST CLOSED 8PM PST
ORDERS ARE POSTAGE PAID
COD - VISA - MASTERCHARGE

APPLIED INVENTION

THE SOURCE FOR SOLID STATE / STATE-OF-THE-ART

GaAs FETS by MITSUBISHI

NEW 2M – Ku Band Very low noise and medium power 14

MGF 1100 Dual Gate GaAs FET 2.5dBNF @ 4GHz	$ 7.25
MGF 1202 (1402 chip in a 1200 package)	$10.00
MGF1404 GUARANTEED 0.65dBNF @ 4GHz	$69.50
MGF1402 0.4 dBNF @ 432, 1.1 dBNF @ 4GHz	$14.50
MGF1412 GUARANTEED 0.8, 0.9 or 1.0 dBNF @ 4GHz from	$21.75

Also MGF1200, MGF1400, MGF1403 and medium power MGF1801

MICROWAVE MODULES

MITSUBISHI X BAND Hybrid Integrated Circuits with Dielectric Resonator (0.12MHz/°C) GaAs FET Oscillators

FO-1010X 10.4 GHz, 15mw out, UER100 Flange	$39.37
FO-1210Y 11.5 or 12.0 GHz UER120 Flange	$39.37
* **FO-UP11KF** Complete Heterodyne Rx, 10.468 GHz LO	$36.22
Use with 2 GHz IF for 12 GHz Satellite TVRO	
* **FO-DP13KF** Doppler Module 10.525 GHv UER100 Flange	$43.05
* **X-Band** 15 dBG die cast horn antenna (UER100)	$17.85
* **GaAs FET Preamp** 1.7-2.1 GHz, 2.0-2.35 GHz, 2dBNF	$49.00

COMPONENTS

	NEW
AI: THE SOURCE for RETICON Universal Active Filters	
R5620 digitally programmed switched capacitor filter	$ 7.85
R5621 dual resistor programmed SCF	$ 6.51
R5622 quad resistor programmed SCF	$11.07
Application notes	$ 2.00

OPTOELECTRONICS from **MITSUBISHI** and **SIEMENS**
CW LASER DIODES, HIGH OUTPUT IRLEDS, PIN PHOTO DIODES, FIBER OPTICS, MORE! CALL

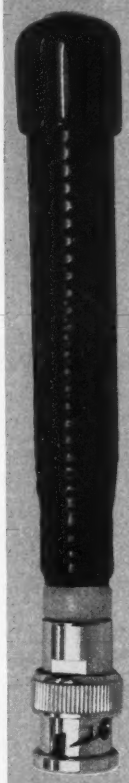
MRF 901 Substitute 2SC2876, Ft=7GHz, 2.2dBNF @ 1GHz	$ 1.50
NEC 64535 direct replacement Siemens BFQ 74	$ 9.66
LEADLESS DISK CAPS 100, 220, 470, 680, 1000 pF	10/$ 2.50
MICROWAVE CHIP CAPS Very low loss VITRAMON P7800 series G02(0.7-1.4 GHz) G04(1.3-2.6 GHz) G01(2.6-4.2GHz)	$ 1.25
VITRAMON VHF/UHF NPO chips 10, 100, 1000 pF	5/$ 2.50
A-B type FW5N 1000pf Feedthru	$ .075
STRIPLINE SHUTTLE TRIMMERS (VOLTRONICS) 0.1-2.5, 0.5-9.0pF	$ 3.34
HI-Q SEALED CERAMIC PISTON TRIMMERS (VOLTRONICS) 0.6-9.0pF	$ 3.58
Thermo Electric Heat Pumps & Sub-Miniature Cryogenic Refrigerators	CALL
3M GX250 glass/fe board, Er=2.55 @ 10GHz 0.031	$0.31/sq. in.
0.062	$0.52 sq. in.
JOHNSON SMA's: Sq flange female $3.50	Male cable$ 2.30

PROMPT SERVICE SEND FOR CATALOG MINIMUM ORDER $5.00
VISA/MASTERCARD Accepted. CASH prepay take 5% discount.
S&H * ITEMS (UPS) $3.75 ALL OTHER ITEMS $2.50 (1st CLASS)
NY STATE RESIDENTS ADD 6% SALES TAX

R.D.2 ROUTE 21 HILLSDALE, NY 12529
518-325-3911 ↙71

Ducks are getting smaller! and...

better!



Because you and the leading radio manufacturers want the best-performing, the best looking antenna; Centurion has grown to be the Duck leader. We've developed many smaller antennas to make the hand-held radio perform better, and now the newest duck...the Tuf Duck "mini". It's shorter (about 3") yet it's a full 1/4 wave radiator on VHF.

Actual Size

CENTURION TUF DUCK™ ANTENNAS

CENTURION
Phone 402/467-4491
Telex 48-4377 CENTURION LCN
P.O. Box 82846 Lincoln, NE 68501 2846

↙102

MFJ 24 HOUR CLOCKS

Your choice: dual 24 hour LCD display, or 24/12 hour with ID timer, or 12 inch quartz analog.

$39.95 DUAL 24 HOUR LCD MFJ-104

Two independant 24 hour LCD displays! Read both GMT and local times at a glance.
Six digit main display has seconds readout. Four digit auxiliary. Switch reverses main/aux.
Alarm plays 4 selectable melodies. Alarm "ON" indicator. Snooze button.
Quartz timing. Synchronizable to WWV.
Flip-top cover serves as stand.
Night light. Forward/reverse, fast/slow set buttons. Lock function prevents mis-setting. Display main time only, main/auxiliary or main/alarm time. Includes battery. 4x2x1/2 inches.

24/12 HOUR, ID TIMER MFJ-102 **$32.95**

Switchable 24 hour GMT or 12 hour format. ID timer sounds every 9 minutes after reset. **Switchable seconds readout.**
Observed timer. Just start clock from zero and note time of event up to 24 hours.
Bright blue 0.6" vacuum fluorescent digits.
Alarm with snooze function. Synchronizable with WWV. Fast/slow set buttons. Lock function prevents mis-setting. Power out, alarm "ON" indicators. 110 VAC, 60 Hz (50 Hz with simple modification). UL approved.
Black, brushed aluminum top/front. 6x2x3".

24 HOUR QUARTZ MFJ-105 **$49.95**

True 24 hour quartz wall clock has huge 12 inch diameter face. Gives excellent visability across computer /radio room.
Fifteen seconds per month accuracy.
Single "AA" battery provides over one year operation, immunity from power line failure and eliminates power cord.
Sweep second hand. Brown hi-impact case. Glass front. 24 hour military time format.

Order from MFJ and try it. If not delighted, return within 30 days for refund (less shipping).
One year unconditional guarantee.
Order yours today. Call toll free 800-647-1800. Charge VISA, MC. Or mail check, money order. Add $4.00 each for shipping and handling.

CALL TOLL FREE 800-647-1800
Call 601-323-5869 in Miss., outside continental USA, tech/repair info. Telex 53-4590 MFJ STKV

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762 ↙233

↙See List of Advertisers on page 114

Seen at the Icom exhibit was this super-sized version of the company's popular IC-2AT handie-talkie.

One-on-one conversations with dealers and designers are commonplace at the Dayton Hamvention and give potential buyers an insight into new equipment and operating procedures.

answer is convenience. You have a substantial structure surrounding you when you stay in a motel or hotel and therefore are not at the mercy of the Dayton weather. Plus, you'll have clean sheets to sleep on, a clean room to come back to after a hard day of hamfesting, and you'll have your own private bathroom to use instead of having to share a campground latrine with all of the other hams who are trying to get to the Hamvention at the same time you are.

The motel room is also more secure than your typical RV or pop-up camper. It's not very comforting to leave the $500 bargain you bought at the hamfest Friday sitting in a tent or the trunk of a car for two days and nights while you are busy searching the flea market for other prizes. And you certainly can't lug the rig around the flea market with you for two days, can you? You can lock it up in a motel room and feel relatively secure. Even if the maid goes in the room to clean and sees your prize sitting there, chances are she won't know what it's used for and won't have any idea of its value. That makes a motel room a pretty good place of safety for a traveling ham.

Expenses

Now that you're convinced that you want to go and have picked your method of transportation and suitable accommodations, let's get down to the grass roots and talk about money. Using my own trips as an example: To travel approximately 500 miles one way and stay three nights in Dayton and then drive back, I've found you will need at least $100 for basic expenses such as gasoline, accommodations, and food. The gasoline and room allowances are based on splitting the cost with at least two other people (it's not much fun to go alone).

As far as food is concerned, it's probably best to keep that separate. If you do stay in a motel you'll have to eat out, and if the cost is left on an individual basis you can order according to your pocketbook. That way, if you want to save as much money as possible to buy that dream rig, you can live on coffee and crackers and save the cash for the really important stuff like a new handie-talkie. Plus, buying your own food will avoid an argument between you and your companions when the waiter brings the check and you try to figure out who ordered the watercress sandwich and who should pay for the extra cheese dip. Food prices are reasonable in Dayton and at the Hamvention, so don't worry. If you have the cash, you won't starve.

How to get the needed cash to pay for the trip is another problem. The best way I've found to raise the necessary capital is to sell some unused equipment. You could try to save up out of the regular budget, but in my case, extra money there is scarce. I know of some hams who sell equipment at their local hamfest and use the proceeds to pay for their trip to Dayton where they buy more gear to resell at their next local hamfest. It's a vicious but very successful circle.

Another way of making money is to rent a flea-market space at the Hamvention and sell some of your unused gear there. After all, 20,000 hams will be passing by your table over the three-day period of the Hamvention, so there's a good chance you'll find a buyer no matter how exotic the equipment is that you have to sell. And that means more money for you to put toward that item you've been searching for. Another successful circle, right?

The flea-market space also has other advantages. It's inexpensive when everyone in the group splits the cost, and it gives your group a meeting place to talk or simply to rest between raids on the flea-market vendors. Even if I wasn't going to sell, I'd still get a space just to have a place to rest and to locate the cooler. (Food prices at the Hamvention are reasonable, but you can beat the beer prices by buying your own.)

While I'm on the subject, the flea-market space is easier to handle if you take two cars to Dayton so that you have one vehicle to drive back and forth to the motel

. . . at last - everything at your fingertips ! ! !

Bring ORGANIZATION & CONVENIENCE to your HAM Station! Eliminate clutter and provide lots of space for everything you need - Tuners, VFO, CW Keyers, Filters, Telephone, Log Book, Etc...

- *ANGLED REAR SHELF*
- *ALL PARTS FITTED*
- *STURDY CONSTRUCTION*
- *WALNUT or PECAN FINISH*

$184.50

Radio Equipment NOT Included
F.O.B. Culver City
(CA Residents add 6% sales tax)

Floor space: 39"w by 30"d.
Also: 51"w by 30"d - $199.50

Dealers Inquiries Invited

A Finely Crafted Piece of Furniture With a REAL Purpose . . .

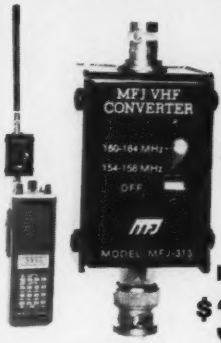
Call : (213) 837-4870 or Write for Information

S-F Amateur Radio Services ✓65

4384 Keystone Ave., Culver City, CA 90230

Hear Police/Fire Weather ✓234

on 2 Meter Handhelds with this MFJ VHF Converter.



Scanning Handhelds become Police/Fire Scanners

MFJ-313
$39.95

New MFJ VHF converter turns your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner.

144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA weather, maritime coastal plus more on 160-164 MHz.

Mounts between handheld and rubber ducky.

Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls.

Highpass input filter and 2.5 GHz transistor gives excellent uniform sensitivity over both bands. Crystal controlled.

Bypass/OFF switch allows transmitting. Won't burn out if you transmit (up to 5 watts) with converter on. Low insertion SWR. Uses AAA battery. 2¼x1½x1½ in. BNC connectors.

Enjoy scanning, memory, digital readout, etc. as provided by your handheld on Police/Fire band.

220 MHz Converter for 2 M Handheld

MFJ-314
$59.95

MFJ-314, like MFJ-313 but lets you receive 221-225 MHz on your 2 meter handheld.

Police/Fire/Weather Band Converter for 2 Meter Mobile Rigs.

MFJ-312
$59.95

MFJ-312, like MFJ-313 but for mobile 2 meter rigs. Transmit up to 40 watts thru converter without damage. SO-239 connectors. Mobile mounting brackets. Rugged. "ON" LED. Use 12 VDC or AAA battery. 3x4x1 in.

Order from MFJ and try it-no obligation. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

Order today. Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for amount indicated plus $4.00 each shipping.

Hear police/fire/weather. Order now.

CALL TOLL FREE . . . 800-647-1800

Call 601-323-5869 in Miss..outside continental USA, tech/order/repair info. Telex 53-4590.

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

AVANTEK

GPD SERIES AMPLIFIERS
GPD 401,402,403
12 - 14 DB GAIN

5 - 500 MHZ POWER 15 VDC TOS MOUNTING
IDEAL FOR COUNTER AND TV PREAMPLIFIERS
COMPLETE WITH CIRCUIT BOARD FOR MOUNTING

$25.00 EA., SET OF THREE $65.00

CALL (804) 489-2156 ✓447

ELECTRONIC HOBBY INNOVATIONS

7510 GRANBY STREET SUITE 207 NORFOLK, VIRGINIA 23505

FREQUENCY COUNTERS to 1.3 GHZ

by OPTOELECTRONICS Inc. Ft. Lauderdale, Florida

NOW IN STOCK

Organize your shack with a

CLUTTERFREE MODULAR CONSOLE $223.69

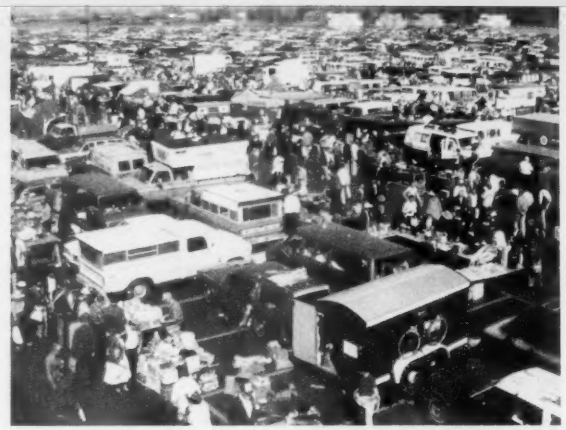
- Large, 42" H x 57" W x 29"D
- Strong groove-construction
- Mar-resistant wood grain finish
- Options, drawers & face plate
- For ham or home computer
- Visa and Master Charge

CLUTTERFREE MODULAR CONSOLES

P.O. Box 5103 Tacoma, WA 98405
(206) 272-0713 ✓89

✓See List of Advertisers on page 114

Sellers meet buyers at the Dayton Hamvention. Shown here is just one of the three large rooms filled by dealers—over 180 at every recent Hamvention.



This bird's-eye view of the '82 Dayton flea market was taken with a wide-angle lens.

and another to leave at the flea market to hold your space for the next day. Last year we couldn't take two cars, and since we had to transport a Teletype® machine to sell, we rented a small trailer. We left that at the Hamvention to hold our flea-market space. The Hamvention has guards at the flea market overnight so there's no problem of theft, and that makes it okay to leave the equipment there that we haven't sold or gear that we've purchased to take home. Also, the trailer was cheaper to pull to Dayton than to pay for the gasoline and wear and tear on another vehicle.

The trailer also gave us a lot more room to carry equipment home and kept us from having to load down a car's trunk with a lot of gear. People who fly to Dayton may get there quicker, but if they find a super deal on a complete Collins station, they'd have to pass it up or pay extra for shipping. The airlines wouldn't classify the Collins as carry-on luggage, would they?

Clothing

I've seen the weather in Dayton shift from below freezing one day to clear skies and 70 degrees the next, so having the proper clothing for the climate is important. The key to dressing for Dayton is the old outdoorsman adage—dress in layers. That way, you can put on or take off clothing as the weather changes. Blue jeans are a basic of my Dayton wardrobe since we're usually too tired to dress up and attend the Friday night FM bash or the Saturday night banquet after running through the flea market and indoor exhibits all day. If you wish to attend one or both of these gala events, be sure to bring along suitable clothing.

But for dressing for the daytime activities, from the belt down, a standard pair of blue jeans, a pair of crew socks and some comfortable, sturdy shoes (that are good for lots of walking) are the prime items. From the belt up, let me suggest starting with a T-shirt followed by a long-sleeve shirt (you can roll up the sleeves if warm weather prevails), a sweater, and a waterproof or water-resistant jacket to turn back the wind and the rain. Also, carry a heavy, winter coat that can be left in the car so it's within reach should the weather take a turn for the worse like I've seen it do.

In addition, I wear a cap, something like a baseball cap, to keep rain and the skin-burning sunshine off my face, and I carry a tube of lip balm in my pocket. Last year the rain and cold weather stayed away, but the wind was crisp enough to leave everybody in our group with chapped lips after the first day.

Group Communications

As far as which radio to take along for communications, your trusty HT is probably all you'll need for staying in touch with the other members of your group. Despite all of the rf produced by 20,000-plus hams, we usually find a two-meter frequency that can serve as a standby. The HTs allow the group members to wander the flea market at will yet stay in touch in case somebody finds a super deal on an item that another member is looking for. The radio link is also good for bringing the group together when it's time to head back to the motel or campground. My HT and a speaker-mike make the perfect combination.

Activities

Planning is also very important once you get to Dayton and inside Hara Arena. As soon as your tick-

CHECKLIST FOR YOUR DAYTON TRIP

- Secure room reservations early, for the nights of April 29 and 30, and if you intend to arrive early on Thursday, for April 28.
- Purchase Hamvention tickets in advance and, if applicable, flea-market space permits.
- Have the members of your group committed to attend the Hamvention and determine your transportation requirements.
- Save enough money to cover the cost of the trip and to cover the cost of any planned purchases. Turn most of your cash into traveler's checks as these are readily accepted at the Hamvention and at the flea market. Personal checks are NOT a readily-accepted method of payment. If a dealer has a choice of a cash sale or taking a risk of accepting a personal check, he'll probably take the cash.
- Pack clothing necessary for your three- or four-day trip. Don't forget, the weather is very changeable.
- Arrange for time off from work if you're part of the laboring class.
- Make and carry a list of things you intend to purchase at the Hamvention. The abundance of equipment found at the Dayton flea market is mind-boggling and could make you forget what you came in there to buy.

DISPLAY YOUR STUFF

With the AEA MBA-RO Reader

Automatic display of transmitted and received Morse and RTTY coded signals has come of age. It is proving to be most worthwhile for improving one's own transmitted "fist" and for allowing SWL's or visitors the opportunity to experience the thrill of Amateur Radio coded transmission.

While no machine can yet match the ability of a skilled CW operator in copying poor fists or signals buried in the noise, the MBA-RO by AEA excells even when compared against units costing much more. The large 32 character display allows much easier reading than shorter displays, especially at higher speeds such as 60 WPM or 100 WPM RTTY. The MBA-RO also features dual filters for RTTY decoding of either 170 Hz or 425 Hz (easily changed to 850 Hz) shift transmissions.

Prices and Specifications subject to change without notice or obligation.
Software ©copyright by AEA.

EEB ELECTRONIC EQUIPMENT BANK
516 Mill Street
Vienna, VA 22180
(703) 938-3350 / 1-800-368-3270
Ten miles west of Washington, D.C.

AEA Brings you the Breakthrough!

MFJ RF NOISE BRIDGE

Lets you adjust your antenna quickly for maximum performance. Measure resonant frequency, radiation resistance and reactance. Exclusive range extender and expanded capacitance range gives you much extended measuring range.

• Exclusive range extender • Expanded capacitance range • Series Bridge

$59.95

This MFJ-202 RF Noise Bridge lets you quickly adjust your single or multiband dipole, inverted Vee, beam, vertical, mobile whip or random system for maximum performance.

Tells resonant frequency and whether to shorten or lengthen your antenna for minimum SWR over any portion of a band.

MFJ's exclusive range extender, expanded capacitance range (±150 pf) gives unparalleled impedance measurements, 1 to 100 MHz. Simple to use. Comprehensive computer proven manual.

Works with any receiver or transceiver. SO-239 connectors. 2 x 3 x 4 inches. 9 volt battery.

Other uses: tune transmatch; adjust tuned circuits; measure inductance, RF impedance of amplifiers, baluns, transformers; electrical length, velocity factor, impedance of coax; synthesize RF impedances with transmatch and dummy load. ✓235

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This bridge is unconditionally guaranteed for one year.

To order, simply call us toll free 800-647-1800 and charge it on your VISA or MasterCharge or mail us a check or money order for $59.95 plus $4.00 for shipping and handling for MFJ-202.

Put this MFJ Noise Bridge to work improving your antenna. Order from MFJ or see dealer.

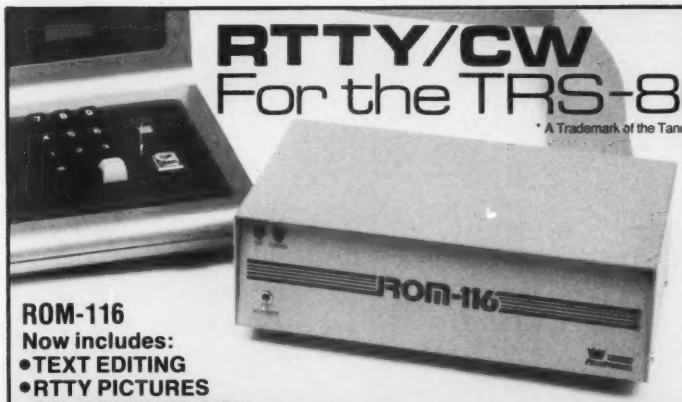
CALL TOLL FREE ... 800-647-1800

Call 601-323-5869 for technical information, order/repair status. Also call 601-323-5869 outside continental USA and in Mississippi.

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

RTTY/CW For the TRS-80*

* A Trademark of the Tandy Corp.



ROM-116
Now includes:
•TEXT EDITING
•RTTY PICTURES
•SAVE TEXT TO DISK *Detailed brochure available on request.*

Featuring:

1200 BAUD OPERATION. Not limited to 110 baud because of timing loops. 60, 66, 75 & 100 W.P.M. Plus 110, 150, 300, 600 & 1200 baud operations possible.

FLEXIBILITY OF OPERATION. Instantly change: Baud Rates; Program Mode (ASCII/Baudot); Program Status.

SPLIT SCREEN VIDEO. Transmit & receive data displayed separately.

REAL TIME. Automatic CW/ID without user intervention. Automatically updates at end of month or year.

Other features include:
- Two Serial Ports
- Fourteen Buffers
- Automatic CW/ID
- Transmit Control
- Selective Call Feature
- Error Correction & Editing
- Word Wraping
- Easy to Interface
- 30 Day Unconditional Guarantee
- Hardware Requirements: TRS-80 Model I or III 16K EXTERNAL TERMINAL UNIT REQUIRED

CROWN MicroProducts
606 State Street, P.O. Box 982-R • Marysville, WA 98270 • (206) 659-4279

✓See List of Advertisers on page 114

HOW CAN I INTERCEPT SMUGGLERS? SECRET SATELLITES? RESCUE MISSIONS? SIGNALS FROM SPACE?

WHAT IS THE TRUTH ABOUT ANTENNAS? TUNERS? PREAMPLIFIERS?

HOW CAN I CHOOSE THE BEST RECEIVER? ANTENNA?

WHAT ARE THE LAWS REGARDING LISTENING IN?

UNCOVER LISTENING EXCITEMENT YOU NEVER THOUGHT POSSIBLE!

For your FREE COPY of MONITORING TIMES--

CALL NOW! Toll-free 1-800/438-8155 (cont. US except NC). Others dial 1-704/837-2216

or write to Grove Enterprises, Dept. D , 140 Dog Branch Road Brasstown, NC 28902 ✓352

et is punched, workers hand you a plastic bag that contains your copy of the Hamvention program. Take a moment to look through this booklet and note the days and times of the various forums and discussions. Check the ones you'd like to attend and try to plan your day's activities around the forum times. The flea market will be there for the duration, but those forums are a one-time thing. If you don't attend them when you can, you might regret it later.

Other Tips

If you want to get a flea-market space close to the building, you'll have to get in line Friday morning pretty early. Selling on Friday starts at noon but those holding advance flea-market permits are allowed to enter the area to set up beginning at 8:00 am Friday. We got into line at 6:00 am last year but had to wait until almost 9:00 to get through the gate. Still, we got a pretty good space, but you can't always depend on luck. Get there early and be sure to buy your permit in advance. It's cheaper that way, plus it lets you check out the bargains before the main crowd comes through the gate.

It's also a good idea to carry a small bag with you if you intend to purchase small parts. That way, resistor, plugs, and transistors don't get misplaced or crushed if you have no place other than your pocket to put them.

Now, if you can remember all of the suggestions listed, a great experience awaits you at the Dayton Hamvention. I'm sure there are a few things I might have overlooked, and there might be some other things you'll want to add because of personal preference, but what I've listed here should be enough to guarantee you a super time at Hamvention 1983. ■

★ Technical Forums
★ ARRL and FCC Forums
★ GIANT 2-day Flea Market Saturday and Sunday
★ New Products and Exhibits
★ Grand Banquet
★ Women's Activities
★ Home-Brew Equipment Forum
★ Special Group Meetings
★ YL Forum
★ Personal Computers Forum
★ CW Proficiency Awards
★ Amateur of Year Award
★ Special Achievement Awards

DAYTON Hamvention®

APRIL 29, 30, MAY 1, 1983

Hara Arena and Exhibition Center — Dayton, Ohio

Meet your amateur radio friends from all over the world at the internationally famous Dayton HAMVENTION.

Seating will be limited for Grand Banquet and Entertainment on Saturday evening so please make reservations early. Banquet speaker is Bill Leonard, W2SKE, former president of CBS News.

If you have registered within the last 3 years you will receive a brochure in late February. If not write Box 44, Dayton, OH 45401.

Nominations are requested for Radio Amateur of the Year and Special Achievement Awards. Nomination forms are available from Awards Chairman, Box 44, Dayton, OH 45401.

For special motel rates and reservations write to Hamvention Housing, 1406 Third National Bldg., Dayton, OH 45402. **NO RESERVATIONS WILL BE ACCEPTED BY TELEPHONE.**

All other inquiries write Box 44, Dayton, OH 45401 or phone (513) 849-1720.

Admission: $7.00 in advance, $9.00 at door. (Valid for all 3 days)

Banquet: $14 in advance, $16 at door.

Flea Market Space: $15 in advance. (Valid for both days)

Make checks payable to Dayton HAMVENTION, Box 2205, Dayton, OH 45401.

Bring your family and enjoy a great weekend in Dayton. Sponsored by the Dayton Amateur Radio Association, Inc.

"BEEPER III"

"THE PROFESSIONAL TOUCH COMES TO AMATEUR RADIO!"

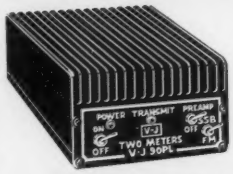
"BP-3 automatically provides a gentle high frequency beep at the beginning of each transmission and a low beep at the end. Virtually eliminates "talk-over"! Operates for up to one year on a single 9-V battery (not supplied). Can be directly interfaced to any transceiver which is keyed by grounding the PTT line (the PTT line voltage must be positive, not greater than 24 VDC, nor the current greater than 100 ma.) Works with virtually all modern gear. You've heard it; now you can have it!"

"ADD THE BEEP!"

"BP-3A Complete with case, cable, Standard 4-pin connectors . . . . . **39.95 pp**
BP-3B As above except without connectors. Add your own . . . . . **36.95 pp**
BP-3C Circuit-board version for custom installation . . . . . **29.95 pp**
All units assembled/tested. OH residents add 6% Sales Tax"

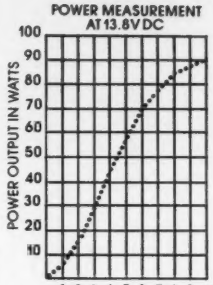
FAXSCAN INC. ✓85
3148 Dorf Drive • Dayton, Ohio 45418 TM

V-J 2 METER 90 WATT OUTPUT AMPLIFIER WITH 18 DB GAIN PREAMP



Model 90PL FOR ONLY **$139.95*** FACTORY DIRECT PLUS SHIPPING

- **FREQUENCY** range 144 - 148 MHz
- **OPERATION FM or SSB** (completely linear) Class AB1
- **RF DRIVE** 1 to 30 watts
- **KEYING RF** activated with high quality relays
- **SSB** operation built in delay
- **POWER REQUIREMENTS** typical 10 watts drive, 13 amps at 13.8 VDC
- **IDLE** current 20 mills
- **MOBILE or FIXED** operation
- **PREAMP** 18DB gain minimum
- **NOISE FIGURE** less than 1.5 DB
- **PREAMP KEYING** independent — separately RF activated relays
- **CONSTRUCTION** wrap around aluminum heat sink 2 pieces 360 degrees cooling
- **SIZE** 7"(w) x 6"(d) x 3"(h) — **WEIGHT** 3 lbs. 9 ozs.
- **IMMEDIATE SHIPMENT**



POWER CHART

SPECIAL OFFER **Matching Power Supply** **$99.95*** PLUS SHIPPING

15 AMP SUPPLY wt. 13 lbs. size 8"(w) x 5"(h) x 6"(d)
IMMEDIATE SHIPMENT
ALL PARTS AND LABOR WARRANTED ONE FULL YEAR

VJ90PL Amplifier $139.95 plus $3.00 shipping
VJ15 POWER Supply $99.95 plus $7.00 shipping
***Prices USA only**

VISA, MASTER CHARGE, M.O. or C.O.D. • PHONE (713) 477-0134

V-J PRODUCTS, INC. 505 East Shaw, Pasadena, Texas 77506
SERVING THE ELECTRONICS INDUSTRY SINCE 1965

We stock:

RADIOS
Azden
Icom
KDK
Kenwood
Santec
Ten-Tec
Yaesu

ANTENNAS
AEA Isopoles
Antenna Specialists
Avanti
Butternut
Cushcraft
Hustler
Hy-Gain
KLM
Larsen
Mini-Products
Mosley
VoCom

ACCESSORIES
AEA Keyers, Code Readers
Alliance Rotors
Ameritron Amplifiers
ARRL Publications
Astron Power Supplies
B & W
Bencher Paddles
Callbooks
CDE (Telex) Rotors
Daiwa/MCM/J.W. Miller
Kantronics
MFJ
Benjamin Michael Clocks
Microlog
Mirage Amplifiers & Meters
Saxon Cable
Telex Headsets
Tokyo Hy-Power Amplifiers
VoCom Amplifiers

ege, inc. ✓453
13646 Jefferson Davis Highway
Woodbridge, Virginia 22191
Store Hours: M-W-F 12 noon—8 p.m.
T-Th-S 10 a.m.—4 p.m.
Information and Virginia Orders:
(703) 643-1063
Call for Quotes
Dealer Inquiries Invited

Your SWL & Marine Communications Dealer

ORDER TOLL FREE 1-800-336-4799 (Orders Only, Please)

Order Hours: M-F 11 a.m. to 7 p.m.;
Saturday 10 a.m. to 4 p.m.
Bonus: 2% Discount
for Prepaid Mail Orders
(Cashiers Check or Money Order)

Send stamp for a flyer.
Terms: Prices do not include shipping. VISA and Master Charge accepted. 2% discount for prepaid orders (cashier's check or money order). COD fee $2.00 per order. Prices subject to change without notice or obligation. No personal checks accepted. Returns subject to 10% restocking fee.

HAVE SOME FUN ON FIELD DAY AND A SECURE POWER SUPPLY ANYTIME YOU NEED IT!

ONLY $359 plus $15 shipping

Windstream charges 6, 12 or 24 volt batteries. Ideal for radio operation and emergencies. Portable (20 lbs), easy to mount and operate.

QUIET, EFFICIENT AND RELIABLE

Strong sitka spruce blades drive a special low rpm generator. Delivers up to 8 Amps. Starts automatically in low winds and self limits in high winds.

DEALER INQUIRIES INVITED

REPLY TODAY FOR FREE INFORMATION

Thermax

THERMAX CORPORATION, DEPT. ST3
One Mill St., Burlington VT 05401
Phone 802-658-1098 ✓238

✓See List of Advertisers on page 114

Fred Cady KE7X
19 Annette Park Drive
Bozeman MT 59715

The Best Way to Mount Your Mobile Rig

If you have a van and HF gear, this is what you need to put them together—including a movable mount.

My wife and I walked out of the car dealer's office after deciding to buy a new camper van. "It will be great," I thought, "to be able to throw kids, dogs, and gear into the van and go." Just then an awful second thought occurred. "I wonder if the HF rig will fit in there?" I ran back into the showroom to eyeball the situation. "Hmm—the two-meter rig will fit to the left of the steering column, but no way am I going to get the HF rig under the dash."

Has this happened to you? Do you have a utility van or four-wheel-drive vehicle with no good place to put a rig? How about a camper or RV where you would like the rig in the front seat for traveling but in the back when stopped or during emergency or public-service operation?

That was the situation I faced—nowhere under the dash to put a rig without major alterations, and a desire to have a more convenient operating position when stopped for the night and a means to tuck the rig out of the way when it was not being used. This article will describe how I installed a rig in a 1980 VW camper. I designed a swinging gimbal mount, easily constructed from pipe and fittings available at most hardware stores, which could be adapted for use in vans and RVs with a central passageway between the two front seats.

Gimbal mobile mount.

Some Basics

First, let's take a look at some good mobile-installation techniques because one should begin by thinking carefully about the installation of mobile radios in modern vehicles and follow some basic principles. Attention should be paid to the 12-V-dc supply, transient protection, the antenna installation and ground system, noise suppression, and theft protection.

The 12-V-dc power should come directly from the battery. Depending on the length of the run and the amount of current, a wire size in the range of 8-12 gauge should be used. (Refer to the *ARRL Handbook* for information on the current-carrying capacity of various wire sizes.) A direct battery connection reduces the chance of high-voltage transients which can easily damage solid-state equipment.

The most damaging transients in an automobile are produced when starting and stopping the engine. Part of the checklist for pilots of light aircraft is to make sure the radio equipment is turned on *after* the engine is started and off *before* it is shut down. This simple procedure can be followed to protect your mobile radio installation. Further transient protection may be obtained by installing transient-suppressive devices in the power-supply leads at the radio. Techniques described by recent articles in *73* and *QST* show how to use devices now available. (See the list of references at the end of this article for more information.)

After the supply of a transient-free 12-V power source, the antenna is the most important aspect of a mobile installation. When the antenna is mounted on the rear of a van or station wagon, the rear door or tailgate can sometimes be in the way, so I have adopted an unconventional antenna mount. Good results have been obtained with two van mobile installations by mounting the antenna on the front of the vehicle. It works just as well, allows a much shorter coax run, and one can see the antenna in the front and watch out for overhead obstructions more easily. It also places the antenna away from the electrically-noisy engine compartment on the rear-engined VW van. The mounting bolt on the front bumper was removed and a longer one used to mount the antenna base. This directly connected the antenna to the chassis of the vehicle and provided a good ground for the antenna system.

A good grounding system is essential in a mobile installation. Many of today's cars have plastic parts in the dash and you must make sure that the rig is securely bonded to the chassis with as short a ground strap as possible. The antenna must be grounded to the frame as well. This can sometimes be difficult. One mobile operator I worked had taken the view that it was so difficult to get a good ground in the mobile installation that he isolated the base of the antenna from the automobile chassis and installed a ground plane by winding wire back and forth under the vehicle. His potent signal on 20 meters verified that this is also a good approach.

Antenna matching also is important. In the old days when rigs with tube finals were used, the swr on the antenna was of little consequence as long as the final would dip into resonance. In fact, best results were obtained by tuning the antenna with a field-strength meter for maximum signal output regardless of the swr indication. With today's solid-state transceiver, however, the swr protection circuits shut down the power output when the swr is greater than about 1.5:1. This means that an antenna tuner is required in most cases, especially if operation is required over any appreciable bandwidth. There are a number of small antenna tuners available today which are very suitable for mobile operation.

Noise can often be heard in a mobile installation. Noise sources fall into four categories—ignition or spark-plug noise, alternator or charging-system noise, instrument noise, and body noise. The 1982 *ARRL Handbook* gives good information on reducing spark-plug, charging-system, and instrument noise. Body noise is caused by various parts of the body not being electrically bonded to the chassis. Differential static charge can build up on these parts and cause severe noise when discharges occur. The solution is to bond the bumpers, trunk lid, and hood to the body electrically with grounding straps. I've found that noise is not a big problem when a good ground system is installed and a transceiver with a noise blanker is used.

Theft protection is best achieved by not advertising the presence of the rig. Quick-disconnect antenna mounts allow the HF antenna to be removed when you are not operating mobile. The swinging gimbal mount described below allows the mobile radio to be shifted around behind the driver's seat to be out of normal view from the outside. It also is designed so that the rig can be removed from the van easily when I am not operating mobile. (In case the worst happens, make sure your gear is fully insured.)

Gimbal mobile mount in operating position.

The Swinging, Gimbaled, Mobile Mount

The main design requirements for the mobile mount in my van were that it could not be under the dash (no room), it had to be movable so that it would not block the center aisle when it was not in use, and the rig had to be easily removable so that I could use it as my base station. These objectives were met with the design described here. In addition, the radio now is accessible from the back when somebody else is driving or while we are stopped for the night.

The photos show the mobile mount. The 12-V-dc power supply is directly connected to the battery, which is conveniently located behind the passenger seat. The radio-mounting bracket is constructed from wood but could be folded from sheet metal. (One also could use the manufacturer's bracket mounted on a piece of wood or sheet metal.) The mount is attached to the top bar of the swinging gimbal with U-bolts. As shown in the photos, the antenna transmatch is mounted under the transceiver. A paddle and small keyer are on the side of the mount and are within easy reach of the driver when in mobile operation.

Fig. 1 shows the design of the swinging-gimbal portion of the mount. It is constructed from two pieces of 1¼-inch pipe, one pipe tee, one regular elbow, and one street elbow. The maximum length of "A" is determined by measuring the distance from the fixed-mounting point to the nearest obstruction which the mount must clear. Subtract 3.5 inches to allow for the tee and elbow connections to be made. The minimum length of "A" is the same as the width of the transceiver-mounting bracket plus about an inch.

Thread this pipe and securely screw the tee and regular elbow onto the ends. The tee and elbow are tapped for 1/4-20 machine screws as shown in Fig. 1. These serve as tension adjusters to keep the mount from swinging too freely. Make the length of "B" the same as "A" but thread only

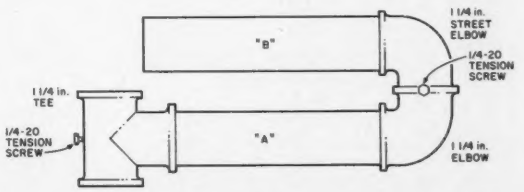


Fig. 1. Gimbal-mount construction detail.

one end and securely screw the street elbow onto it. You are now ready to install the mount in the vehicle.

I had a table mount in back of the driver's seat onto which I slipped the tee joint and tightened the tension screw. You may have to provide a vertical pipe screwed into a pipe flange mounted on the floor of your vehicle. If this is the case, replace the tee in Fig. 1 with an elbow. Screw the street elbow on the end of pipe "B" into the regular elbow on pipe "A" and tighten the tension screw so that the arm will swing from the storage position to the operating position. Use U-bolts to attach the transceiver mount to "B." Dress all power-supply leads, grounds, coax, and speaker leads along the pipe with the mount extended, and tape securely.

Conclusion

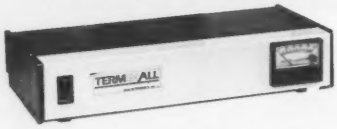
It is very easy to start mobile operation with today's solid-state rigs. A little care with the installation can result in many hours of happy mobiling. By providing a transient-free environment one also is able to protect the transceiver from destructive voltage spikes. A good grounding system is the key to an effective antenna installation and also will help reduce noise. A swinging, gimbaled, mobile mount as described above can be adapted for use in many vehicles where there is not enough room to mount a rig under the dash. ■

References

1. *ARRL Radio Amateur's Handbook*, 1982 edition, chapters 10 and 17.
2. Keith Grenier AKØQ, "Surviving the Unthinkable—part II: some practical ideas," *73*, June, 1982.
3. Ken Stuart and Gene Collick, "Protect Your Equipment from Damaging Power-Line Transients," *QST*, February, 1982.

TERMINALL

RADIO MODEM



apple · TRS-80 · ATARI

SEND & RECEIVE CW & RTTY

TERMINALL is a hardware and software system which converts your Personal Computer into a state of the art communications terminal.

- TERMINALL is easy to use. Plug into your receiver headphone jack and copy Morse code or radioteletype. Plug into your CW key jack and send Morse code. Attach a Microphone connector and send Baudot or ASCII RTTY using audio tones (AFSK). That's all there is to hooking it up.
- Fantastic Morse reception. No adjustments are necessary to receive Morse code. It's fully automatic! Six stage active filter demodulator and auto adaptive Morse algorithm copies the weak and sloppy ones.
- Separate RTTY and CW demodulators. Built in crystal controlled AFSK. CW and PTT keying. 60 mil loop interconnect, RS 232 IN and OUT, hand key input and side tone output.
- Built in parallel printer driver software allows hardcopy in all modes.
- Hardware clock maintains accurate time.
- Multiple user defined WRU functions. You select: imitate sequence, terminate sequence, what to transmit back and whether to save on tape or disk.
- Word wrapping, word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width, transmit delay (fixed, none or auto adaptive), excellent documentation, break mode and much more.
- TERMINALL has capabilities far surpassing dedicated terminal systems. And since it works on a general purpose computer, the majority of your investment (your computer) is spread out over many different applications. **You get more for your money.**
- Complete with software on cassette and diskette, assembled and tested hardware, and extensive instruction manual. Call or write for specifications on TERMINALL for TRS-80 Model I or Model III, Apple or ATARI 400/800 COMPUTERS. $499.
- 15 day money back trial period. One year parts and labor limited warranty on factory direct orders.

To Order

(209) 667-2888 ↙44

MACROTRONICS, inc.

1125 N. Golden State Blvd.
Turlock, CA 95380

COD

* Apple is a Registered Trademark of Apple Inc.
TRS-80 is a Registered Trademark of Tandy Corp.
Atari is a Registered Trademark of Atari Inc.
Shipping U.P.S. Reg. Del. $4.00. CA residents add 6% sales tax.

MIDCOM

CALL NUMBER ONE!

CARLOAD INVENTORIES • ROCK BOTTOM PRICES

SUPER-FAST SERVICE

LINES:								
AEA	ALPHA	CUSHCRAFT	DENTRON	KANTRONICS	MINI-PRODUCTS	NYE	TEN TEC
AVANTI	BEARCAT	COLLINS	HY GAIN	KLM	MOR GAIN	PALOMAR ENG	UNIVERSAL
ASTRON	BIRD	CDE	HUSTLER	KENWOOD	MIRAGE	REGENCY	UNARCO-ROHN
ALLIANCE	BENCHER	DRAKE	ICOM	MICROLOG	MFJ	SWAN	VIBROPLEX

CALL TOLL FREE 1-800-325-3609

IN MISSOURI 314-961-9990

MID-COM ELECTRONICS • 8516 MANCHESTER ROAD • BRENTWOOD, MO 63144

VISA

↙52

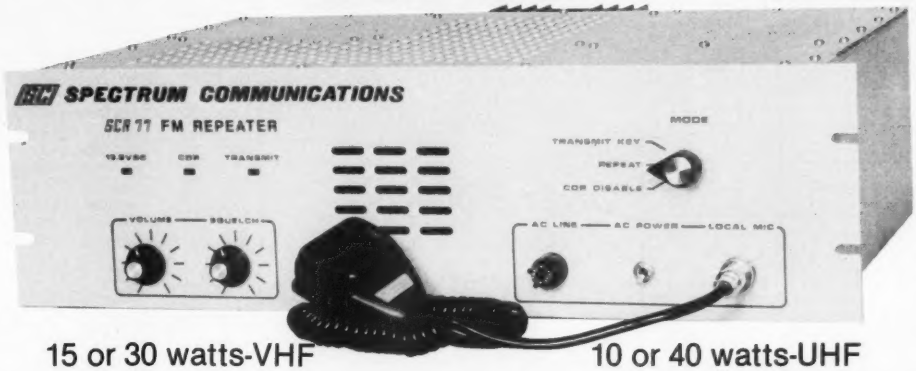
SCR77 'Basic' Repeaters

Simply The Finest Quality 'Low Cost' Repeaters Available!

new

From Spectrum-'The Repeater Specialist'

For 2M, 220 & 440 MHz



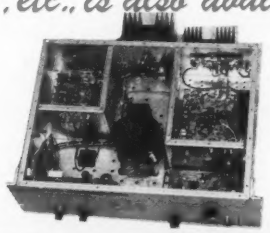
15 or 30 watts-VHF — 10 or 40 watts-UHF

Includes:
- **0.3 μV Rcvr. 8 Pole IF Filter**
- **Crystals—high stability .0005%**
- **Local Mic**
- **Your Call programmed into IDer**
- **Provision for Auto-Switchover to Btry. Pwr.**
- **High stability TX Oscillator/Oven on UHF unit**
- **Built-in 115/230V AC Supply; basic Panel Controls, Spkr., LED Indicators**

If you're looking for a new Repeater, but you really don't need (or can't afford) all the features and options on our world famous, 'Super Deluxe' SCR1000/4000, then our new economy line of SCR77 Repeaters is ideal for you!

These new Repeaters maintain the quality of design, components and construction which made Spectrum gear famous. However, all of the "bells & whistles" which you may not need or want have been eliminated—*at a large cost savings to you!* The SCR77 is a real "workhorse" basic machine designed for those who want excellent, super-reliable performance year after year—*but no frills!* ('PL', 12 Pole IF Filter, Front End Preselector, and a 30/40 Wt. Transmitter are the only "built-in" options available, but Autopatch, Remote Control, and other equipment can be connected via the rear panel jack.)

A complete line of duplexers, antennas, cabinets, cable, etc., is also available.



Of course, if you do want a full featured/super deluxe repeater, with higher power and a full list of available 'built-in' options, then you want our SCR1000 or 4000 "Dream Machine". These units will continue to be available for those who want 'The Ultimate in Repeaters'.

SCR77 Pricing (15Wt.): 2M or 220MHz, $995.00 Amateur Net. 440MHz, $1150.00. For no 'plug-in' ID board (Export), deduct $40.00. *Call or write today for a data sheet, or to place your order!* Sold Factory Direct or through Export Sales Reps only.

Now located in our new, larger plant! Thanks for your 8+ years of support!

SEE NEXT PAGE FOR ACTION!

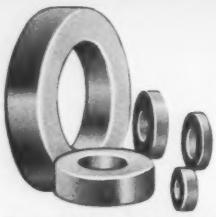
SPECTRUM COMMUNICATIONS

68

1055 W. Germantown Pk, S4 • Norristown, PA 19401 • (215) 631-1710 • Telex: 846-211

See List of Advertisers on page 114

Toroid Cores



- **All the popular sizes and mixes.**
- **Fast Service. Same day shipment via first class mail or air.**

IRON POWDER TOROIDS:

CORE SIZE	MIX 2 .5-30 MHz u = 10	MIX 6 10-90 MHz u = 8.5	MIX 12 60-200 MHz u = 4	SIZE OD [in.]	PRICE USA $
T-200	120			2.00	4.25
T-106	135			1.06	1.75
T-80	55	45		.80	1.05
T-68	57	47	21	.68	.95
T-50	51	40	18	.50	.70
T-37	42	30	15	.37	.60
T-25	34	27	12	.25	.45

RF FERRITE TOROIDS:

CORE SIZE	MIX Q1 u = 125 .1-70 MHz	MIX Q2 u = 40 10-150 MHz	MIX H u = 850 to10MHz	SIZE OD [in.]	PRICE USA $
F-240	1300			2.40	9.00
F-114	1500			1.14	2.50
F-87	900	300		.87	1.25
F-50	750	250	5000	.50	.80
F-37	550	200	4000	.37	.60
F-23	250	100	1500	.23	.50

Chart shows uH per 100 turns

Ferrite Beads slip over 18 ga. wire
FB-1 for 50-200 MHz **$2/dozen**
FB-2 for 50 MHz & below . . . **$2/dozen**
Jumbo Beads slip over #12 wire
FB-3 for 50 MHz & below . . . **$3/dozen**

EXPERIMENTER'S KITS

Iron Powder Toroids **$10.00**

Includes:
1 ea. T25-12, T37-2, T80-2, T106-2.
2 ea. T25-6, T37-6, T50-2, T50-6.
3 ea. T68-2.

RF Ferrite Toroids **$10.00**

Includes:
1 ea. F50-Q2, F114-Q1.
2 ea. F23-Q1, F23-Q2, F37-Q1. F37-Q2, F50-Q1, F87-Q1.

TO ORDER: Specify both core size and mix for toroids. Packing and shipping $1.50 per order USA and Canada. Californians add 6% sales tax.

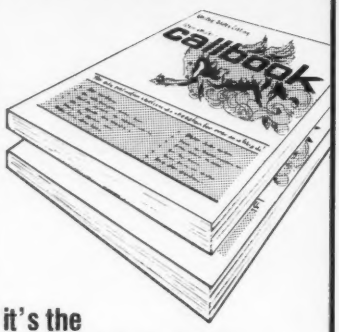
master charge — Minimum Credit Card Order: $5.00 — VISA

Fast service. Free brochure and winding chart on request.

Palomar Engineers
Box 455, Escondido, CA 92025
Phone: (619) 747-3343

When it comes to

QSL's...



it's the
ONLY BOOK!
US or Foreign Listings

1983 callbooks

Here they are! The latest editions of the world-famous Radio Amateur Callbook are available now. The U.S. edition features over 400,000 listings, with over 75,000 changes from last year. The Foreign edition has over 370,000 listings, over 50,000 changes. Each book lists calls and the address information you need to send QSL's. Special features include call changes, census of amateur licenses, world-wide QSL bureaus, prefixes of the world, international postal rates, and much more. Place you order for the new 1983 Radio Amateur Callbooks, available now.

	Each	Shipping	Total
☐ US Callbook	$19.95	$3.05	$23.00
☐ Foreign Callbook	$18.95	$3.05	$22.00

Order both books at the same time for $41.95 including shipping.

Order from your dealer or directly from the publisher. All direct orders add shipping charge. Foreign residents add $4.55 for shipping. Illinois residents add 5% sales tax.

AMATEUR RADIO

SPECIAL OFFER!
Amateur Radio Emblem Patch
only $2.50 postpaid

Pegasus on blue field, red lettering. 3" wide x 3" high. Great on Jackets and caps.

ORDER TODAY!

61

RADIO AMATEUR callbook INC.
Dept. B
925 Sherwood Drive
Lake Bluff, IL 60044, USA

hy-gain ANTENNA ROTATORS

for your peace of mind.

Determine the total wind-load area of your antenna(s), plus any antenna additions or upgrading you expect to do. Now, select the matching rotator model from the capacity chart below. If in doubt, choose the model with the next higher capacity. You'll not only buy a rotator, you'll buy peace of mind.

ROTATOR MODEL	ANTENNA WIND-LOAD CAPACITY: MOUNTED INSIDE TOWER	ANTENNA WIND-LOAD CAPACITY: WITH STANDARD LOWER MAST ADAPTER
AR22XL or AR40	3.0 sq. ft. (.28 sq. m)	1.5 sq. ft. (.14 sq. m)
CD45 II	8.5 sq. ft. (.79 sq. m)	5.0 sq. ft. (.46 sq. m)
HAM IV	15.0 sq. ft. (1.4 sq. m)	N/A
T²X	20.0 sq. ft. (1.9 sq. m)	N/A
HDR300	25.0 sq. ft. (2.3 sq. m)	N/A

For HF antennas with booms over 26' (8 m) use HDR300 or our industrial R3501.

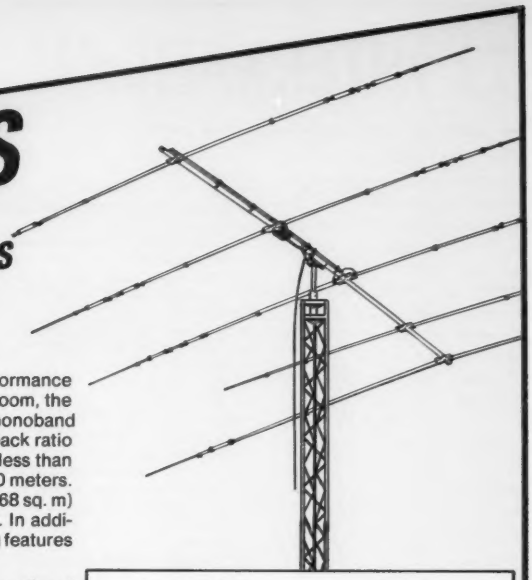
Full details at better Amateur dealers or write:

TELEX hy-gain
TELEX COMMUNICATIONS, INC.
9600 Aldrich Ave So., Minneapolis, MN 55420 U.S.A.
Europe: Le Bonaparte - Office 711, Centre Affaires Paris-Nord, 93153 Le Blanc-Mesnil, France

hy-gain®

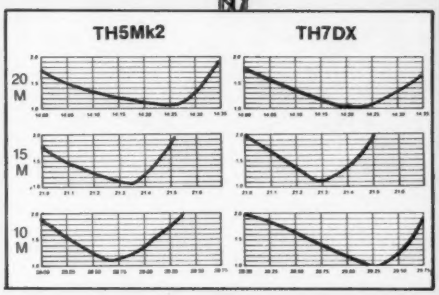
THUNDERBIRDS

NEW BROADBAND TRIBANDERS LOAD NEW AUTO-TUNE SOLID STATE RIGS



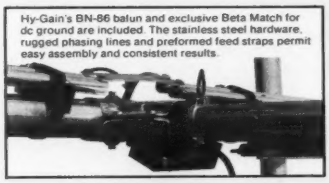
TH5Mk2 Now you can enjoy outstanding broadband antenna performance in a size to fit most city lots. With 5 elements on a 19 ft. (5.8 m) boom, the TH5Mk2 has 4 active elements on each band. Hy-Q traps and monoband parasitic elements achieve an 8.5 dB gain and an *average* front-to-back ratio of 19 dB on 20 and 10 meters, and 22 dB on 15 meters. VSWR is less than 2:1 over the 20 and 15 meter bands, and from 28.0 to 29.4 MHz on 10 meters. The TH5Mk2 weighs only 57 lbs. (25.8 kg). And with just 7.5 sq. ft. (.68 sq. m) surface area, wind-loading is 190 lbs. at 80 mph (86 kg-129 km/h). In addition, the TH5Mk2 offers the same solid construction and outstanding features as the TH7DX. See common features below.

TH7DX The new standard of comparison for high performance broadband tribanders. Using a dual driven 7 element system, the TH7DX maintains a VSWR of less than 2:1 on all bands including ALL of 10 meters and WITH 8.8 dB gain. The unique combination of Hy-Q trapped and monoband parasitic elements produces an *average* front-to-back ratio of 22 dB on 20 and 15 meters, and 17 dB on 10 meters. Even with this amazing performance, the TH7DX boom is only 24 ft. (7.3 m) and the entire array is no bigger than the famous TH6DXX. Weight of the TH7DX is 75 lbs. (34 kg) with surface area of 9.4 sq. ft. (.87 sq. m) and wind-loading of 240 lbs. at 80 mph (108.9 kg-129 km/h).



FEATURES COMMON TO TH5Mk2 AND TH7DX

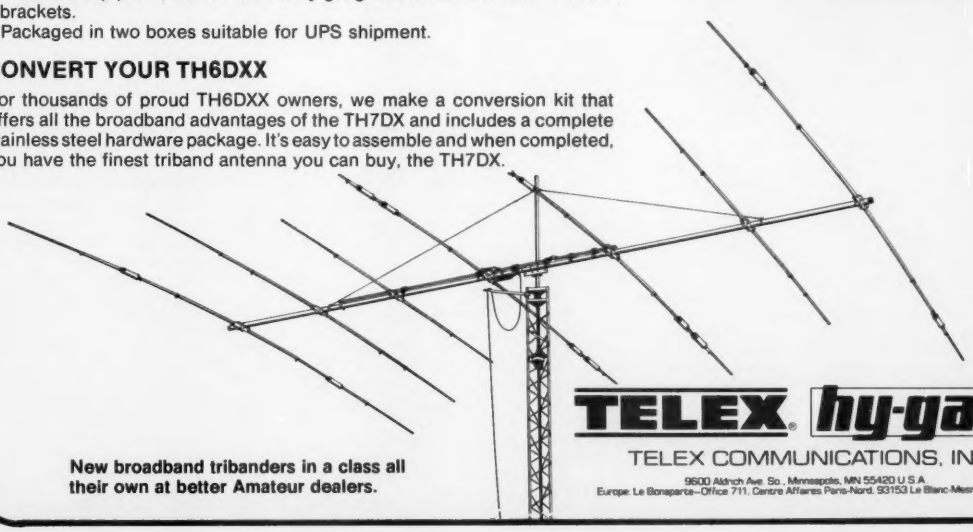
- Broadband dual driven element system.
- Separate, highly efficient Hy-Q traps for each band handle maximum legal power with a 2:1 safety margin.
- Unique Beta Match assures efficient energy transfer.
- dc ground for lightning protection.
- BN-86, 50 ohm balun included.
- Preformed feed straps.
- Stainless steel hardware and compression clamps for all electrical and most mechanical connections.
- Taper swaged 6063-T832 thick-wall aluminum tubing.
- Rugged die-cast aluminum boom-to-mast bracket.
- Twist and slip proof, die-formed heavy-gauge aluminum element-to-boom brackets.
- Packaged in two boxes suitable for UPS shipment.



Hy-Gain's BN-86 balun and exclusive Beta Match for dc ground are included. The stainless steel hardware, rugged phasing lines and preformed feed straps permit easy assembly and consistent results.

CONVERT YOUR TH6DXX

For thousands of proud TH6DXX owners, we make a conversion kit that offers all the broadband advantages of the TH7DX and includes a complete stainless steel hardware package. It's easy to assemble and when completed, you have the finest triband antenna you can buy, the TH7DX.



New broadband tribanders in a class all their own at better Amateur dealers.

TELEX® hy-gain®

TELEX COMMUNICATIONS, INC.

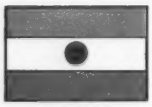
9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.
Europe: Le Bonaparte—Office 711, Centre Affaires Paris-Nord, 93153 Le Blanc-Mesnil, France

See List of Advertisers on page 114

73 INTERNATIONAL

Beginning this month, 73 brings you amateur radio news from around the world. In this collection of reports from our foreign correspondents, 73 will present the latest news in DX, contests, and events, as well as keep you abreast of the technical achievements of hams in other countries.

If you would like to contribute to your country's column, write to the country editor or to 73: Amateur Radio's Technical Journal, *Pine Street, Peterborough NH 03458, USA, Attn: Avery L. Jenkins WB8JLG.*



INDIA

Amar N. Banerjee VU2CZ
PO Box 3005
New Delhi-3
India

The Government of India has permitted each Indian ham to obtain foreign exchange to the tune of about 1,000 dollars every year to import amateur equipment, parts, and instruments. It is not necessary to obtain an import license; hams can just go to the bank and obtain a draft or open letter of credit on the basis of a pro forma invoice. Customs duty is about 68 percent for transceivers and more than that for other items.

Three Indian amateurs distribute equipment made by Yaesu, Icom and Kenwood. During the middle of 1982, Yaesu offered a "slashed price" for their equipment and "rock-bottom concessions" for the VHF hand-held FT-207R. As a result, there is a sudden growth of VHF activity in India, and about 80 of the FT-207R rigs are expected to arrive by the end of 1983. Fifteen FT-207Rs were used to maintain a communication link between the stadiums of the 9th Asian Games at New Delhi and Jaipur.

The IBP Indian beacon is now operational around the clock at New Delhi. Its callsign is VU2BCN, and it is on FM at 28.295 MHz.

The decades-old 10-kHz slice in the 80-meter band has been expanded to 50 kHz. VU amateurs now operate from 3500-3540 kHz and from 3890-3900 kHz.

The total number of valid amateur licenses was expected to pass 1,100 by January, 1983.

The new WARC bands have not yet been opened for use in India.

Air-Net India assembles every day on 14.150 MHz at 1530 UT. There also are daily nets on 7 MHz and 3.5 MHz.

Commemorative callsigns, past and present:

- October, 1969—prefix VU0 rather than VU2 to mark the Gandhi Centenary Celebrations. The Amateur Radio Society of India issued a Worked Republic of India (Gandhi Centenary) Award.
- August-December, 1972—Callsign VU25 instead of VU2 marked the 25th anniversary of Indian independence.
- May, 1979—VU25ARS marked the 25th anniversary of the Amateur Radio Society of India.
- November, 1981—AU2CD was issued to mark the annual children's day celebrations, which begin every year on the birthday of the late Jawaharlal Nehru, the first Prime Minister of India.
- December, 1981—AU2SIF was issued to the station at the South Indian Fair at Hyderabad.
- August to December 15, 1982—Callsign prefix VU9 instead of VU2 to mark the 9th Asian Games being held in India at New Delhi, Bombay, and Jaipur.
- November 14, 1982 to December 4, 1982—Callsign VU82AG was issued to VU2CJ/VU2ARD to begin on the annual children's day celebrations at the site of the celebration. This callsign was to continue until the end of the 1982 Asian Games.
- November 24, 1982 to December 4, 1982—Callsign AU9ASG was issued to VU2APR (Hyderabad APARS) representing the 9th Asian Games. A group of amateurs from South India, Hyderabad, maintained HF communications between Jawaharlal Nehru stadium, New Delhi and the Asian Games stadium at Jaipur.

A cyclone hit the western India coastal area in November of 1982. Civil communications links were disrupted, and three radio amateurs from APARS Hyderabad (South India) rushed in and rapidly established communications on HF along with radio amateurs of Gujurat. Successful two-way communications around the clock were provided from eight affected stations for the district authorities who were conducting relief operations. This is the second major participation of amateurs in India since the disaster of the Morvi floods in the same state a few years ago.

HONG KONG

John H. Holstead VS6HJ
1 Sugar Street, 20/Floor
Causeway Bay Commercial Building
Causeway Bay
Hong Kong

P. J. Weaver VS6CT
10A Bonaventure House
91 Leighton Road
Hong Kong

The Hong Kong Amateur Radio Transmitting Society, better known as HARTS, has been in existence and actively engaged in amateur radio in this Pearl of the Orient, the British Crown Colony, since pre - WWII days.

At present, there are approximately 150 licensed members. HARTS is affiliated with the Radio Society of Great Britain. It also is a member of the International Amateur Radio Union. The membership is extremely unusual in that it is composed of many nationalities, e.g., Chinese, British, German, Canadian, American, Australian, and others.

Just last year and for the first time, a Visitor License was introduced, and approximately a dozen amateurs from other countries received this unique license. It is issued to the holders of amateur licenses with whom the United Kingdom has reciprocal agreements, and is issued to those persons who will not be residents for more than 90 days. The only requirements are to have the original license (with photocopy for Post Office file) and passport, and upon payment of $100.00 HK ($16.00 US), permission to operate using the home call /VS6 will be granted. This license is valid for one year. For further information, one should write directly to: Telecommunications Division (Maritime Services), G. P. O., 2 Connaught Place, Hong Kong.

Remember that HARTS does have a warm HEART! If any amateur radio friends pass through this crossroad of South East Asia, they are invited for an "eye ball" at the regular Tuesday meeting, 1700 local (excluding public holidays) at the Cable and Wireless Sports Club, Caroline Hill Road (Hong Kong Island side). For additional information concerning HARTS, please write to its president, Bob Frost VS6BQ, HARTS, PO Box 541, Hong Kong.

HONG KONG AWARDS

CATCH 22 AWARD. Applicant must submit verified evidence of two-way contact with other amateur stations located on the 22nd parallel of latitude north (see list). A Hong Kong station contact is obligatory.

Only contacts after 1st January 1980, are valid. Endorsements for mode and band may be requested.

The award is available in three classes: Class 3—contacts with at least 15 countries; Class 2—contacts with at least 20 countries, and Class 1—contacts with all 25 countries.

Fee US$7.00 or equivalent currency.

All awards will be returned by airmail, and upgrade stickers may be applied for with a fee of US$1.00.

Countries list:

1.	VS6	Hong Kong
2.	CR9	Macao
3.	BY	China
4.	BV	Taiwan
5.	XV	Vietnam
6.	XW	Laos
7.	XZ	Burma
8.	S2	Bangladesh
9.	VU2	India
10.	A4X	Oman
11.	A6X	U.A.E.
12.	HZ	Saudi Arabia
13.	ST	Sudan
14.	SU	Egypt
15.	5A	Libya
16.	TT8	Chad
17.	5UT	Niger
18.	7X	Algeria
19.	TZ	Mali
20.	5T5	Mauritania
21.	CN	Morocco
22.	C6	Bahamas
23.	CO	Cuba
24.	XE	Mexico
25.	KH6	Hawaii

NINE DRAGONS AWARD. One contact with a country in each of the following 9 zones: zones 18, 19, and 24 to 30 inclusive. Contact for zone 24 must be a VS6. Stations within the 9 zones require 2 contacts in each zone, with 2 VS6 contacts. Only contacts after 1st January 1979 are valid. Fee is US$3.00 or 25 IRCs.

FIRECRACKER AWARD. Six contacts with different VS6 stations. Stations in zones 18, 19, 24 to 28 require 10 contacts with different VS6 stations. Only contacts after 1st January 1964 are valid. Fee is US$2.00 or 10 IRCs.

The usual conditions apply to these awards: Send certified log extracts only; no QSL cards are required. Payment to be made in cash or checks payable to HARTS. If sending postal orders please leave payee blank. Claims to Awards Manager, HARTS, G.P.O. Box 541, Hong Kong.

HONG KONG—ACORNS TO OAK TREES

A couple of years ago, the International DX Foundation ran an expedition to several different countries in the Far East which ended up in Macau where, after completion, the team left for the United States and left the amateur radio gear in Macau to be used by subsequent visiting amateurs. The equipment was in fact used twice and then returned to me (VS6CT) in Hong Kong for return to America. However, by the time freight costs were taken into consideration, it was felt that it would be better to sell or donate the gear to worthwhile persons. A Yaesu 901 was sold, a Denton linear was donated to 9M8PW, and the other transceiver—a Yaesu FT-101ZD—was donated to the Boy Scouts Association of Hong Kong.

As a direct result of this donation, one of our regular licensed amateurs, Kenny Chan VS6CN took on the task of organizing a radio club within the Scouting movement here in Hong Kong and commenced training classes for 20 interested Scouts. Happily, they all sat for the City and Guilds of London, Radio Amateur Examination, held at the beginning of December and we eagerly await the results, due early in 1983. Possibly by the time you read this, VS6EA, the Boy Scouts Club station, will be on the air operated by new licensees whose introduction to amateur radio was brought about solely because of the International DX Foundations donation of gear.

Another tale in a similar vein was that of the committee of the Hong Kong Amateur Radio Society (and myself as President) getting the Hong Kong Post Office to extend the no-code VHF license currently available in the United Kingdom to Hong Kong. The first committee session with the Post Office was set up early in 1981, and after much discussion the first VS6X license was issued in the spring of 1982. To date, we have 55 no-code VHF licenses issued, opening a new era in amateur radio activity in Hong Kong. The most interesting aspect was in persuading the local Post Office not to follow the UK regulations too tightly and allow local use of 50 MHZ in keeping with ITU recommendations that no-code licenses be permitted to operate above 30 MHZ.

The enthusiasms of this new group of amateurs is refreshing; the first weekend in December, on their own initiative, they attempted 2-meter DX to Japan from Hong Kong, spending 36 hours under canvas on a high hilltop above Kowloon with a 40-element array on 2. Japan was heard, but the reverse, this time, was not, so all that could be credited was a cross-band contact; but it's a great start for a totally new group of amateurs and we are hoping for greater things to come.

AMATEUR RADIO IN HONG KONG

As Hong Kong is linked with the United Kingdom in all matters relating to international affairs, it follows that we adhere to those conditions of licensing applicable in the United Kingdom, except where region three varies in frequency allocation, i.e., we use 50 MHz, which is not allocated in the UK.

There currently are two classes only of amateur license issued in Hong Kong, the full license for all bands, all modes and the restricted license, telephony mode with frequencies in the 50, 144, and 430 MHz bands.

The requirements for a class A license issued to a newcomer to amateur radio in Hong Kong are that he should be over 16 years of age, a British subject, have passed the City and Guilds Radio Amateur Examination, be proficient in the Morse code,

The ultimate team... the new Drake "Twins"

The TR7A and R7A offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! **Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard,** plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! **The very effective NB7 Noise Blanker is now standard.**

New! **Built in lightning protection** avoids damage to solid-state components from lightning induced transients.

New! **Mic audio available** on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! **NB7A Noise Blanker supplied as standard.**

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! **Standard ultimate selectivity choices** include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

• **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

Specifications, availability and prices subject to change without notice or obligation.

DRAKE

See your Drake dealer or write for additional information.

COMING SOON: **New RV75 Synthesized VFO Compatible with TR5 and 7-Line Xcvrs/Rcvrs**

• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive operation** with main transceiver PTO or RV75

R. L. DRAKE COMPANY • 540 Richard Street, Miamisburg, Ohio 45342 • Phone (513) 866-2421 • Telex 288-017

* Patent pending

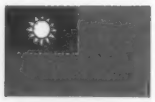
tested to 12 wpm, and have paid a HK$100 annual license fee.

For a class B license (restricted, telephony only) there is no requirement for the Morse-code proficiency test.

The above licenses are issued to persons who will be resident more than three months in Hong Kong. In the event that a person takes up residence and has an overseas license, he will be granted a full VS6 license of the class which he holds, i.e., a full or restricted license.

Currently, the conditions of the existing license are being reviewed as it contains no permission to operate mobile, although oral agreement has been given and we have considerable activity on two meters, where we have two repeaters—VS6HK, 145.650-150 and VS6KP, 145.750-150.

For propagation purposes we also are operating two beacons, both located at Mt. Kellet on Hong Kong Island at an elevation of 500 meters—VS6TEN on 28290 and VS6SIX on 50.075.



TAIWAN

Tim Chen BV2A/BV2B
PO Box 30-547
Taipei, Taiwan
Republic of China

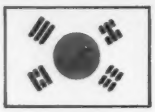
Sherry and Wayne W2NSD were here to participate in an electronic show sponsored by Taiwan manufacturers. The Greens had been to Taipei at least three times in years past, and were pleased to see the changes and development of Chinese electronic products. The exhibition takes place annually and attracts visitors and buyers from all directions. In the show this year we saw that computer science is quite popular and fascinating.

During October and November I had 25 hams or radio fans visiting my station BV2A/BV2B (the only licensed station in Taiwan). In November, I won the first place trophy of the International Lions Club Radio Contest on CW. This led to considerable publicity which I was able to use to promote the interests of hams and amateur radio. For example, the Taiwan Broadcasting Corporation and its substations across the territory have widely commended the great interest in ham activities and urged local authorities to grant more station licenses without delay.

Director chairman David Rankin 9V1RH/VK3QV was traveling on his way to Singapore from Tokyo and stopped over at Taipei last October. Accompanying me, David was to exchange information on world amateur radio with a VIP of the Post and Telecommunications Department. His impression is that Taiwan is a free and open society with a booming economy and many progressive youths keeping abreast of the state of the art in sciences. He felt that there should be many more ham stations on the air. However, the China Radio Association and Amateur Radio Commission are working closely on this matter.

Please note the following:

- For BV2A, QSL manager is Charlie Moraller K2CM in the States.
- For BV2B, QSL direct to PO Box 30-547, Taipei, R.O.C. (Box 101 will not be used after February, 1983).
- On Wednesday, 1130-1400Z BV2A CW 21030/21100 or 14025/14040, and SSB 21270/21350 occasionally. Also, 1400-1600Z BV2B SSB 14218/14250 ± .
- On Saturday, 2300-2400Z BV2A CW 14025/14040 or BV2B SSB 14218/14250.
- On Sunday, 0000-0200Z BV2A CW 21030/28030 or BV2A SSB 21350/28530.



KOREA

J. Michael Wengert HL9KT/KH2AC
CPO Box 2961
Seoul, Korea

Amateur Radio in Korea is on the upswing with the announcement last year that Seoul would be host to the Asian Games in 1986 and the Olympics in 1988. Until that time, little notice was given to the public relations aspect of ham radio by the Korean government or by the average citizen. With the active efforts of KARL (the Korean Amateur Radio League) and AARCK (American Amateur Radio Club of Korea), ham radio has almost become a household word. In the past year, many newspaper and broadcast accounts of the public service aspects of the hobby have reached the public, and the government is beginning to ease its stringent control of the import of transmitting equipment and also is allowing new modes of operation.

In Korea, operation is permitted by Korean nationals who pass a written exam and, in some cases, a CW test. The most popular license is the 3rd class radiotelephone license. This is obtained by passing a comprehensive theory, regulation, and operational examination administered twice a year by the Ministry of Communications (MOC). There is no code exam for this class license and the written exam is roughly equivalent to the US General Class FCC exam. Privileges for this class are phone operation only in the 80, 40, 15, 10, 6 and 2m bands. The 3rd class radiotelegraph exam is the same as for radiotelephone but includes a CW test and allows CW operation on the same group of frequencies. The power limit in both cases is 50 Watts output.

A more difficult exam, including a section on English ability and a faster code test, brings a Korean ham the 2nd Class License with 100 Watts and additional operation on 20 meters. A small number of Korean hams have the coveted 1st Class Ham License which permits transmitter output power up to 500 Watts and has an equivalently more difficult examination. If an aspiring Korean ham successfully gets his operator's license, he may operate a club station and/or apply for his own station license.

At this writing, although the licensed operators number more than 7,000, fewer than 700 club and private station licenses have been issued. There are several reasons for this, the most important being the difficulty in getting suitable transmitting equipment. Additionally, the issuance of a station license (and hence a callsign), is extremely difficult. Due to the security problems of a divided Korea, the north being a hostile state, a close background check is conducted on all individuals applying for a station license. When the background check is cleared, then permission to construct a station is forthcoming.

If an individual is successful in obtaining some transmitting gear and puts up his antenna system he will then be issued a callsign. But his actual permission to operate is not issued until inspectors from the MOC have visited the ham's shack and confirmed that the station complies with current regulations as specified by the ham's class of license. Only then may the new ham go on the air and begin to really enjoy the international hobby to its fullest extent.

Even if the new ham submits his application for station license immediately, it takes upwards of 6 months to get on the air. For the benefit of newcomers with no knowledge of amateur radio regulations, operation, or theory, KARL conducts three-week cram classes several times a year. What about those HL9 stations you hear with American accents? We'll cover amateur radio licensing for foreigners in next month's column. 73 from the Land of the Morning Calm.

PAPUA NEW GUINEA

Siegi Freymadl P29NSF
PO Box 165
Rabaul, Papua New Guinea

In a country of inaccessible terrain such as Papua New Guinea has to offer, communications are of vital importance. As far as telecommunications are concerned, this country has one of the most modern microwave systems with some of the transmitters powered by solar energy. We can dial STD and ISD. This is a country of paradoxes, where Stone-Age and modern technology coexist.

The radio amateur is privileged in PNG, as generally he is not restricted as to number or height of antennas and has less QRM to contend with. This is particularly so in my case. I live on New Britain Island 80 km from Rabaul, on a cocoa/copra plantation. We have no neighbours for 5 km on either side, no television, and no local council to object to the "antenna farm"—an amateur's paradise.

To become an amateur, one has to sit for exams identical to those given to candidates in VK, on the same days, and at the same time as in Australia. For the CW exam, one now has to make the trip to Port Moresby where the radio inspector will give the test (700-km crow-flight miles, but *many* more by sea from Rabaul). That is one reason why I now will have to remain a Novice! Traveling that far is out of the question.

When I sat for the Morse exam a little over three years ago, the radio inspector came to various centers to hold the tests, but, of course, it proved to be too costly an exercise for the department. Then, the theory and regulations papers were mailed and kept in the care of the local postmaster until the day and hour of the exams. One then completed them under his watchful eye.

Amateur licenses are issued by the Radio Branch of the Posts and Telecommunications Corporation in Port Moresby and the licensing fee is K6.00 per annum (about $7.50). The Papua New Guinea Amateur Radio Society is the official body representing amateurs in PNG, and Peter P29PS is the interim president. The address of the PNGARS is PO Box 204, Port Moresby; the address of the QSL Bureau is PO Box 141, Port Moresby. There now is a North Solomons Radio Society for amateurs on Bougainville Island, but at this time I have no further details.

There are around 120 amateurs in PNG, of whom one is a national: Sidney Kulupi P29SK, who is the manager of the Radio Branch.

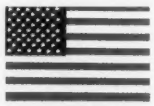
There are two repeaters: P29RPM Port Moresby 146.40/147.00 and P29RAE Mount Albert Edward 146.05/146.65. A repeater is in the process of being built at Bougainville which we hope will link up with Mt. Albert Edward.

The PNGARS has a society net every Thursday on 3565 KHz ± QRM, at 0930 GMT. The Society also publishes a newsletter, *Garamut* (a garamut is a native drum), which appears sporadically. One of the biggest problems probably is that the amateurs are scattered over such a vast area. For instance, on my 600+ km long island there are only two other amateurs, both in Rabaul: Andy P29SA and Syd P29SS.

The PNGARS sponsors the very attractive Bird of Paradise Award. Requirements are seven contacts (all bands permitted, all modes) with amateurs in five different provinces. (There are 19 provinces in Papua New Guinea, although there are not amateurs in every province.) The awards manager is Col Button P29NAB, PO Box 2450, Konedobu, National Capital District, Papua New Guinea; the fee is K2.00 or 10 IRCs. It is a good idea to ask for details of the province, when making contact with a P29 amateur. The Bird of Paradise Award is a beautiful one and certainly an adornment to any shack, but Col reports very few applications of late; so how about it?

At the moment, conditions are very poor on 15 and 10, but I am very active and doing my best to put P29 on the map. Of course, 20m is off limits, as I am only a Novice.

That's all for today. I'll see you next month with more news. Best 73!



GUAM

J. T. Pogue KH2AR
68 Banyan Circle
FPO San Francisco CA 96630

We have a popular T-shirt here that reads WHEREINTHEHELLISGUAM? That's a fair question, and the answer to it seems like a good way to begin this column about our island.

For you geographers, Guam is located at 13°28' north and 144°45' east. For the rest of us, that translates as roughly 3600 miles west of Honolulu, 1500 miles east of Manila, 1500 miles south of Tokyo, and 6000 miles west of Los Angeles. It is the largest island connected with the US government between Hawaii and the Philippines, as well as the most populated. Indigenous residents (composed mostly of native-born Guamanians and people of Filipino, Japanese, Chinese, and Korean ancestry) number approximately 85,000. There are also another 20,000 people connected with the US armed forces and US government.

Guam is often known in this part of the world as the "Caribbean of Japan." With more than 75% of the annual 300,000 tourists coming from there, the title seems to fit.

From 1521 when Magellan stumbled upon the island until 1898, Guam was part of the Spanish Colonial Empire. Administered first from Mexico, then later from the Philippines, Guam was an important link in the flourishing galleon trade between east and west. As a result of the Spanish-American War, Guam came under the mandate of the US government. With the exception of a period of Japanese occupation during WW II, the island has progressed steadily toward modernization, Americanization, and self government.

The island's present status is that of an unincorporated territory. However, there now is a newly-kindled interest in changing this status to full commonwealth. The people here remain some of the most loyal and patriotic citizens under the US flag.

Ringo Ranger II

Simply the best

The best combination of gain, bandwidth and low angle radiation for simplex or repeater operation.

Quick easy assembly and installation

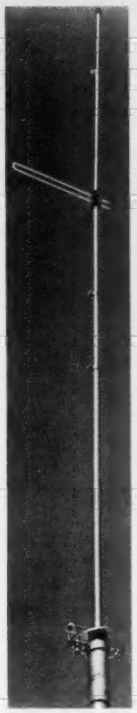
Mount anywhere with compact dimensions and neat appearance

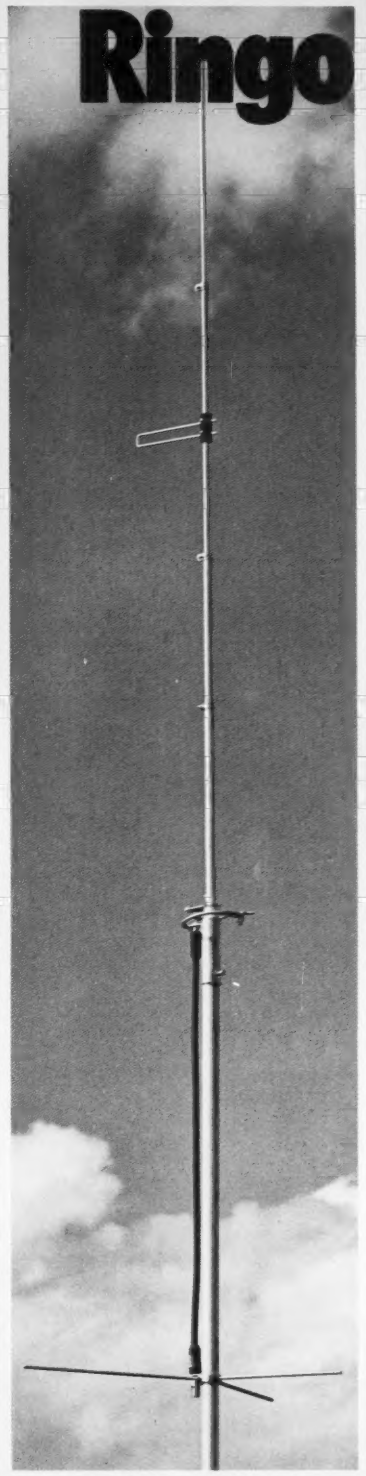
Proven performance and durability in all environments

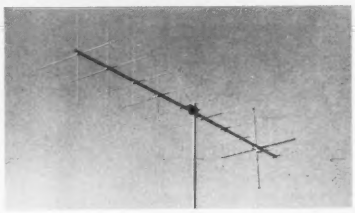
Complete FM band coverage

One year warranty

Cushcraft antennas created the FM antenna revolution by making the best performance and value available to every ham. We continue to set the pace with a broad line of antennas for every FM application. Tune across the band and you will find the overwhelming majority of hams using one, two, or more Cushcraft antennas. The reason is very simply that they are the best. Now is the time for you to enjoy the value of a Cushcraft antenna. See your nearby dealer today.







RINGO RANGER II

ARX-2B	134-164 MHz
ARX-220B	220-225 MHz
ARX-450B	435-450 MHz

RINGO RANGER

ARX-2	134-164 MHz

RINGO

AR-6	50-54 MHz
AR-2	135-175 MHz
AR-10	28-29.7 MHz
AR-220	220-225 MHz
AR-450	440-460 MHz

MOBILE ANTENNAS

AMS-147	144-148 MHz	Magnetic Mount
ATS-147	144-148 MHz	Trunk Lip Mount
AMS-220	220-225 MHz	Magnetic Mount
ATS-220	220-225 MHz	Trunk Lip Mount

YAGIS

A147-4	145.5-148 MHz	4 Element
A147-11	145.5-148 MHz	11 Element
A147-22	145.5-148 MHz	22 Element
214-FB	145.5-148 MHz	14 Element
A220-7	220-225 MHz	7 Element
A449-6	440-450 MHz	6 Element
A449-11	440-450 MHz	11 Element

CROSS YAGI

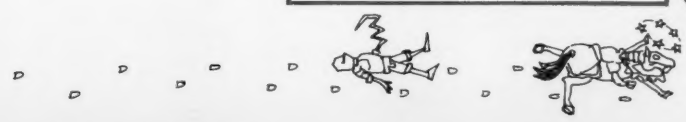
FOR CW/SSB and FM

A147-20T 144-146 MHz Horizontal
145.5-148 MHz Vertical

cushcraft CORPORATION

THE ANTENNA COMPANY
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108

✓106



✓See List of Advertisers on page 114

Ham radio got an early start on Guam. With the presence of many US servicemen and civilians in the early part of the century, it proved to be a great source of recreation as well as a convenient way to stay in touch with the rest of the world. The FCC didn't seem to show much interest in callsigns prior to WW II, so the fellows who operated from here invented their own prefix. The OM prefix (which stood for Oceania-Marianas) may be familiar to some old-timers.

After the war, the FCC got its act together and established the KG6 prefix with the additional allocation of KG6R, KG6S and KG6T for the newly acquired trust-territory islands of Rota, Saipan, and Tinian respectively. Later, in their sometimes confusing "wisdom," the feds once again changed these prefixes to KH2 for Guam and KH0 for the Northern Marianas.

At present, there are approximately 100 hams on Guam, with roughly 60% of them active on HF. The ham population is about 75% military and 25% civilian. With frequent transfers for the military people, the ham population receives a constant infusion of new operators anxious to add the KG6 or KH2 prefix to logs around the world.

Until next time, Hafa Adai from Guam.

NEW ZEALAND

D. J. (Des) Chapman ZL2VR
459 Kennedy Road
Napier
New Zealand

The amateur radio scene in New Zealand as observed through the latest available IARU statistics informs us that there are 5631 licensed operators here, 2898 (51%) being members of the New Zealand Association of Radio Transmitters (NZART), the New Zealand equivalent of the ARRL. Our current net annual increase in licensed amateur operators is about 6%, or around 300 each year. Amateur radio operator examinations are held twice each year, in March and September, and they attract about 500 candidates; the pass rate is approximately 50%.

A growth comparison with the United States from the same IARU statistics available here in New Zealand indicates the present US net growth rate is a little over 1%, so, even though there are many more amateur radio operators in the USA, the growth rate here is approximately six times the US growth rate for our hobby. Therefore, even though we are a small country (population about 3.5 million) amateur radio is very much alive and on the increase in popularity here, "down under."

Our regulatory body is the New Zealand Post Office, a government agency. (The Post Office in New Zealand operates, controls, and constructs the telephone, telegraph, telex, and radio-telephone communications network services, savings bank services, collection and distribution work on behalf of other government departments and agencies, as well as the postal and mail-handling services.) The amateur service is controlled and regulated by Radio Inspectors of the Post Office, who also control and regulate all radio broadcasting and communications services, commercial and private. There is an annual license fee of about US$10.00 for an amateur radio operator's license, and our maximum allowable power input is 150 Watts.

The ZL scene covers most aspects of our hobby—ATV, slow scan, RTTY, VHF, UHF, SHF, EME, AMSAT, and, of course, CW, SSB, and a little old-fashioned AM.

In future columns I shall discuss in depth the activities in these and other specialized aspects of our hobby practiced here on the New Zealand scene. Also from time to time I will cover awards within ZL, DXpeditions within our area, contests, and other subjects considered to be of interest to amateur radio readers of *73*.

BITS 'N PIECES

For prospective visitors to ZLland, a reciprocal license is easily obtainable from the Radio Inspectors Branch of the Post Office, provided the amateur's country of origin has reciprocal rights with ZL; I shall supply the necessary information on this subject in another issue.

There is a fairly extensive 2m VHF repeater network covering the two main islands, and also some 70cm UHF repeaters in the four main centers and in one or two other areas. So, for the visitor, a 2m hand-held opens up the ham scene through any of the 45 repeaters in the system as you travel throughout our country. If the overseas amateur operator is fortunate to be visiting a locality when the local Radio Club monthly meeting night is scheduled, a warm welcome awaits the visiting ham, and he/she is usually escorted to the meeting venue by one of the local members. Over the past 12 months my local club, in a town of just under 50,000, has been host to visitors from Canada, the United States, Australia, and South Africa at our monthly meetings—and it is only one of the 80 branches (clubs) of the NZART scattered throughout New Zealand!

COMING ZL HAPPENINGS

World Communications Year, 1983—New Zealand Activity Day, 0000 GMT to 2400 GMT, May 21—the Council of NZART has designated this 24-hour period as our main activity for WCY. ZL operators will be active on all bands and modes for the 24-hour period to ensure that New Zealand does its bit toward WCY. Special callsigns will be used for WCY Activity Day—ZLland has been divided into 8 regions, and each regional coordinator has been allotted a WCY callsign for use by the stations operating in their areas, demonstrating ham radio to the public.

Look for ZLs 1 to 4 and 6 to 9 WCYs during the 24-hour period on all bands and all modes; see if you can work all 8 regions on the special activity day.

Commemorative QSL cards will be sent to all stations contacted by New Zealand WCY Activity Day/stations via the QSL Bureau system. However, if your station does not participate in the system, the operator *must request direct QSL at the time of the QSO*, and send an SAE plus 3 IRCs with details of the QSO, to the ZL WCY station worked, c/o NZART QSL Bureau, PO Box 40-212, Upper Hutt, New Zealand. It is not necessary to send your QSL card—our Commemorative QSL card will be sent automatically via the QSL Bureau unless otherwise arranged during the QSO.

NZART Annual Conference and Convention—Friday, June 3, 1983, to Monday, June 6, 1983, at Dunedin in the South Island, ZL4 land. Overseas visitors very welcome. Enquiries to PO Box 6050, Dunedin, New Zealand.

Should there be any questions from *73* readers about the ZL amateur radio scene, or on topics discussed in this column, write to me at my ZL address, but please include 2 IRCs for an airmail reply. All letters will be answered, provided the return postage is included as requested.

CHILE

Patricio Fernandes H. CE3GN
PO Box 14781
Santiago de Chile

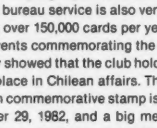
The Radio Club de Chile was founded by a small group of visionary radio experimenters on July 12, 1922, and has just celebrated its 60th year since that date of historical significance for all Chilean hams. The Chilean Society has grown to be one of the most active radio organizations in all of South America.

The club, a member of the IARU since its founding, owns a comfortable two-story building with a variety of facilities for the club's 2,200 members. There is a conference hall which can hold over 500 people and three radio shacks with modern equipment for all modes. The building also contains several classrooms for students attending the various courses given throughout the year which prepare them for the final examinations before getting their Novice and General tickets.

The Import Department provides members with up-to-date equipment from different manufacturers all over the world. The club even has a stock of a variety of gear which is sold to members at convenient prices. Another office, the VHF Department, is in charge of the various 2-meter repeaters belonging to the club, which are located at very high spots around Santiago. The QSL bureau service is also very active, handling over 150,000 cards per year.

The events commemorating the 60th anniversary showed that the club holds an important place in Chilean affairs. There was a Chilean commemorative stamp issued on December 29, 1982, and a big meeting at one of the auditoriums of the Diego Portales Building in downtown Santiago. Over 400 members and important government authorities were present, including Colonel Jaime Machuca, Subsecretary of Telecommunications. The Colonel was representing the President of Chile, General Augusto Pinchet Ugarte XQ3GP. Also present were Carlos Kaufman, president of Radio Club Argentino, representing both the IARU and the ARRL, and Sr. Enrique Sazie, one of the founders of the Radio Club de Chile. A plaque and gold medal were presented to him in recognition of his extensive work on behalf of amateur radio.

Also, a private lunch was held at CE3JK's QTH in honor of Carlos Kaufman, and in the evening there was a meal served for over 250 people at a private club in Santiago, at which Rogelio Gomez, president of the Radio Club de Chile, presided.



BRAZIL

Carlos Vianna Carneiro PY1CC
Rua Afonso Pena 49, Apt. 701
20270 Rio de Janeiro, RJ
Brazil

Gerson Rissin PY1APS/PY7APS
PO Box 13178, Copacabana
20000 Rio de Janeiro, RJ
Brazil

The Rio DX Party first sponsored last October by the Brazilian CW group, PPC (the Picapau Carioca—the Carioca Woodpeckers), with the cooperation of all other Brazilian CW groups, will be held again from 1500 UTC March 26 to 1500 UTC March 27. The main purpose is to promote two-way QSOs between Brazilian and DX stations, enabling both to FB QSL for awards and so on. No logs, no nothing except quick QSLing is essential. Exchange RST/Name/QTH, and try to get as many rare Brazilian prefixes as you can. There are 26 (or even 27 if you are lucky to get one of the rare Brazilian ocean islands PY0 prefixes).

For best fun, the best CW operators in Brazil will be invited by calls and letters to join in so that prefix-hunters can have a good day! Ever get a PU8 CW QSL? No? Neither have I! So, I'll meet you at the Party, with the PT8s, PR7s, PT9s, PS8s, PY9s, and, who knows, maybe even a PU8, too!

All HF bands, first 20 to 50 kHz, and also from 21130 to 21150 kHz, aiming at USA Novices.

Brazilian prefixes, in order, are:

PP1—Espirito Santo ES
PP2—Goias GO
PP5—Santa Catarina SC
PP6—Sergipe SE
PP7—Alagoas AL
PP8—Amazonas AM
PR7—Paraiba PB
PR8—Maranhao MA
PS7—Rio Grande do Norte
PS8—Piaui PI
PT2—Distrite Federal DF (Brasilia)
PT7—Ceara CE
PT8—Acre AC
PT9—Mato Grosso do Sul MS
PU8—Amapa AP
PV8—Roraima RR
PW8—Rondonia RO
PY1—Rio de Janeiro RJ
PY2—Sao Paulo SP
PY3—Rio Gran de do Sul RS
PY4—Minas Gerais MG
PY5—Parana PR
PY6—Bahia BA
PY7—Pernambuco PE
PY8—Para PA
PY9—Mato Grosso MT
PY0T—Trinidade Island
PY0F—Fernando de Noronha Is.
PY0S—Sao Pedro/S. Paulo Rocks

RECIPROCAL LICENSES IN BRAZIL

These are the countries Brazil has reciprocal licenses agreements with: Germany, Bolivia, Canada, Chile, Costa Rica, Great Britain, United States of America, Paraguay, Portugal, Dominican Republic, Sweden, Switzerland, Denmark, Venezuala, Colombia, and France.

OLD MISINTERPRETED CW

Just like everywhere else, in Brazil there are many yeses and many nos to CW! The same empty arguments, the same Bla-Bla-Bla (empty talk) we hear and read from all parts of this radio amateur world of ours! The only difference is: Here we are acting different! We work for CW instead of keeping talking and talking. Since 19 years ago, the PPC Group (the only CW group) has been helping, developing, and stimulating CW use among radio amateurs in Brazil. First there was a very simple 10-Member QSO Award; then a National CW Contest; then a second one (a QRS Contest for beginners); then Certificates—about 5 or 6—and a PPC Certificate Hunters Club; then new awards and certificates aiming at DX operations, jumping frontiers in all directions and considering two-way interests; and now, the Rio DX Party twice a year and supervision of the WWSA CW Contest (Worldwide South American Contest), sponsored by *Electronica Popular*, the only Brazilian radio amateur magazine, and in close supervision of GACW Argentina CW Group, wherefrom came the idea.

And how about results? You may ask! First, many many other CW groups were

A fresh idea!

Our new crop of tone equipment is the freshest thing growing in the encoder/decoder field today. All tones are instantly programmable by setting a dip switch; no counter is required. Frequency accuracy is astonishing ±.1 Hz over all temperature extremes. Multiple tone frequency operation is a snap since the dip switch may be remoted. Our TS-32 encoder/decoder may be programmed for any of the 32 CTCSS tones. The SS-32 encode only model may be programmed for all 32 CTCSS tones plus 19 burst tones, 8 touch-tones, and 5 test tones. And, of course, there's no need to mention our one day delivery and one year warranty.

SS-32 $29.95, TS-32 $59.95

COMMUNICATIONS SPECIALISTS

426 West Taft Avenue, Orange, California 92667
(800) 854-0547 / California: (714) 998-3021

↙ 15

MasterCard VISA

born, all aiming exactly at the same ideals. New Brazilian hams are studying CW not just for examination purposes but because they love CW and because CW is now a very strong mode in Brazil.

Still suspicious, friends? Well, question the fabulous family of Brazilian CW groups: GPCW in Santos SP, CWSP In S. Paulo, GCWA in Araras SP, ABCW in SP, UBR in Recife, PACW in Para, CWSA In SP, CWRJ in Rio, PRCW in Curitiba, MCG in Rio Grande do Sul, Tabajara Tribe in Espirito Santo, Pantaneiro in Mato Gosso, CWDF in Brasilia, CWMG in Minas Gerais, and I *can't* finish because there's a new one born every moment!

RESULTS OF THE 1982 WORLDWIDE SOUTH AMERICA CW CONTEST

DX Winners

7 MHz—JH7BDS
14 MHz—OK2TBC, JH1IFS, JA1OHP
21 MHz—F6DKV, W4VQ, DL1BBO
28 MHz—EA7CJM
Multi-Band—DL8KJ, AI9J, N6MU
Multi-Op—LZ1KDP, OK3KEX, JA7YOJ

South American Winners

3.5 MHz—CX8DT, LU2DPW, PY2RNJ
14 MHz—PY5MR, PY7HQ, PP2JT
21 MHz—PY1DPP, PY1TCJ, PY4SS
28 MHz—PY1CBW, PY1EHN/PY8, PY7CW
Multi-Band—CX7BY, LU9DIE, YV4BOU
Multi-Op—PY2EXD, PY1EDB

Continental Winners Multi/Single

Africa—	ZS6ME
Asia—	JF1YPF
Europe—	DL8KJ
N. America—	AI9J
Oceania—	KH6CP
S. America—	CX7BY

Continental Leaders—Multi/Multi

Asia—	JA7YOJ
Europe—	LZ1KDP
S. America—	PY2EXD

AWARDS

UBR AWARD. Sponsored by the CW group Uniao Besouros do Recife, the UBR Award is available to all licensed amateurs for confirmed contacts with UBR members. Contacts must have been made after September 1, 1975, on any amateur band. Only two-way CW mode. No QSL. Send GCR log of stations worked (call, date, time, band, mode, and report) and 10 IRCs to: Uniao Besouros do Recife, PO Box 1153, 50000 Recife, Pernambuco, Brazil.

There are no special endorsements for the UBR Award.

UBR Members:

PY7AEF	PY7CC/1	PP6AAC
PY7ADL	PY7DM	PP7IE
PY7AEV	PY7RO	PP7FAL
PY7AOR	PY7RX	PP7JCO
PY7AVZ	PY7ZZ	PR7AEN
PY7AW	PY1AFM	PR7CM
PY7BBX	PY1APS	PT7AW
PY7BTX	PY1DHG	PT7AC
PY7BXC	PY1RJ	PT7PA
PY7CCZ	PY3AVF	PT9EJ
PY7CW	PY5NR	

DCM AWARD. Sponsored by LABRE—Rio de Janeiro, the DCM (Wonderful City Award) is available to all licensed amateurs for confirmed contacts with stations located in at least 10 Administrative Regions (RA) of the city of Rio de Janeiro (the well-known Brazilian Wonderful City). There are no special endorsements for the DCM Award. Contacts may be made on any date, in any band, and in any mode. Send log of stations worked (call, date, time, band, mode, and report) together with the QSL cards and 5 IRCs to: DCM Award, LABRE—Rio de Janeiro, PO Box 58, 20100 Rio de Janeiro, RJ, Brazil.

THE FIRST BRAZILIAN AMATEUR

In 1909, in the city of Curitiba, state of Parana, South Brazil, Livio Moreira began his first experiments in wireless transmissions. Together with his friend Flavio Luz, they constructed two radios with crystals of carborundum and with antennas sixty-five feet high. In 1910, for the first time, they could exchange signals between their houses, about 1.2 miles of distance. In 1912, when he was in Germany on a governmental mission, he studied what Germany was doing in that field.

After the first World War, Livio continued his experiments, and after hard work he finally built in 1924 a transmitter delivering 10 Watts which he used for his rare contacts. The first broadcast station, founded in his state in the same year, also used this equipment for its transmissions.

After the establishment of the Brazilian Amateur Radio League, he received the callsign PY5AG. Our homages to Livio Moreira—The First Brazilian Amateur.

SWITZERLAND

Peter W. Frey HB9MQM
PO Box 1127
CH-5401 Baden
Switzerland

Switzerland may be the country of breathtaking scenic beauty, the land of banks reportedly solid as a rock, and of cheese famous the world over, but it is certainly not an award hunter's heaven. I know of only two awards issued by local clubs (Old Lucern Award and Lake Zurich Award), and the national society, the Union of Swiss Short Wave Amateurs (USKA) also has just one award to offer—the Helvetia Award.

This last award, named after the tribe of the Helvetians who settled in Central Europe during Caesar's reign, is definitely not an easy one to work. You are required to show proof of contact with stations in all of Switzerland's 26 cantons (or states), many of them smaller than an average county in the United States and some of them with a ham population of fewer than ten amateurs licensed to operate on HF. Whereas it's quite common to get in contact with a station in one of the big city cantons of Zurich, Berne, Basle, or Geneva, it can prove rather frustrating trying to get hold of an amateur in one of the rural cantons like Appenzell-Innerrhoden or Obwalden where there are fewer than five licensed operators! No wonder a German award hunter recently remarked to me, "It's darned-sight easier to work 50 states for the WAS than it is to work 26 cantons for that Swiss award!"

The Helvetia award is issued for HF contacts on or after January 1, 1979, in three categories: CW and/or phone, RTTY, and SSTV. The award can also be worked on 144 MHz, 430 MHz and 1.3 GHz. So far, no diploma has been issued in the RTTY or SSTV categories and only one Swiss amateur has succeeded yet in working all 26 cantons on 23 centimeters. Hansruedi Lauber HB9RG, the proud owner of the first Helvetia award on SHF: "Exactly half of the contacts were made with expeditions staged especially for the purpose of giving me another canton. Without the help of many friends this would not have been possible!"

Expeditions—that is the way to work those rare cantons on HF, too. Expedition time in Switzerland is coming up soon: During the Helvetia contest usually all cantons are put on the air, and this year's affair runs from Saturday, April 23, 1400 UTC until the same time on Sunday, April 24. There is a good chance, for example, to get hold of the canton of Appenzell-Innerrhoden during this contest. Listen for the call sign HB9OE. Or, if you still need that rare canton of Uri, the operators of club station HB9AJ will be happy to be of help. The Helvetia contest runs on all bands from 160 meters to 10 meters, WARC bands excluded, and is a phone/CW affair.

If the Helvetia awards sounds like a challenge to you, why don't you contact USKA's awards manager for a copy of the rules. Write Walter Blattner, PO Box 450, CH-6601 Locarno, Switzerland. If you would like to know more about the Helvetia contest, the man to contact is USKA's traffic manager, Gody Stalder HB9ZY, Tellenhof, CH-6045 Meggen, Switzerland. Both would appreciate an SAE with two or three IRCs for an airmail reply.

WEST GERMANY

Hans J. Schalk DJ8BT
Hammarskjold-Ring 174
D 6000 Frankfurt 50
West Germany

Ralf Beyer DJ3NW
Opferkamp 14
3300 Braunschweig
West Germany

If the purpose of a contest is the testing of one's own station and operational abilities under difficult conditions, this one may be considered as a contest in the classic meaning. The calls and comments we received after the contest indicated that many alterations of individual FAX stations were made as a result of gained experiences. This first FAX contest resulted in a number of function-related discoveries, not only in a technical sense but also from an operational point of view.

Responses were very positive as a rule and all participants seem to have enjoyed the event. Total participation of about 30 different stations was unexpectedly high. We wish to thank especially the 18 stations which sent in their logs. Class A was well represented with an input of 9 logs. Unfortunately, no log was received for class B. Also, we missed the logs of those amateurs from class C who are usually involved in satellite receiving. Contest traffic took place on 80-, 20-, and 2-meter bands. A maximum of 7 countries could be worked.

The following stations were monitored on shortwave: DF7NF, DF7XA, DF0BUS, DJ8BT, DL2XP, DL6FAG, DL6LAG, EA4TI, F6ACU, F6AEO, F6CDX, G3ZJG, G4KGB, HB9BZY, LX1BC, LX1PQ, LX1SW, LX2FD, and OE9AHI. Also on UKW were QRV: DB2HA, DB4LM, DB0DB, DD8BP, and DL9LAG.

The conditions on 80 and 20 meters were satisfactory, depending on the time of day. Conscious interference by CW, RTTY, and/or SSB stations could not be observed, and we are grateful to these operators. The contest rules have proved valid, in our opinion, but rules for the next contest will have to be revised in connection with club stations.

We wish to express our gratitude in the name of the German Amateur Radio Club (DARC) to all contestants and their efforts. Our congratulations for the winners of class A and C. All contestants who sent in their logs to the first DARC FAX contest will receive a certificate in remembrance of this event.

CONTEST 1983 DARC "CORONA" 10-METER RTTY

DARC has the great pleasure to invite radio amateurs worldwide to participate in the annual 10-Meter RTTY Contest, which is held to increase RTTY activity on the 10-Meter amateur band. There will be four tests through the year. Each test scores separately.

Schedule: 1st Test, March 5th, 1100–1700 UTC; 2nd Test, May 8th, 1100–1700 UTC; 3rd Test, September 3rd, 1100–1700 UTC; 4th Test, November 6th, 1100–1700 UTC.

Band: The recommended portions of 10 Meters.

Contest Call: CQ CORONA TEST.

Exchange: RST/QSO Nr./Name

Points: Each station to be contacted once only. Each complete 2-way RTTY QSO is worth 1 point.

Multiplier: Use the WAE and DXCC country list, add each district in W/K, VE/VO and VK.

Scoring: Total multipliers times total number of QSOs.

Classes: A—Single or multi-operator; B—SWL, printer.

Logs: Must contain name, call, and full address of participant/Class/Time in UTC/Exchange/Final score. SWL printers apply according to the rules.

Deadline: Each entry must be received by the manager within 30 days after each test.

Manager: Klaus Zielski DF7FB, PO Box 147, D-6455 Erlensee, West Germany.

Plaques: Will be awarded to the leading

RESULTS OF THE FIRST DARC FAX CONTEST

Class A	Points	QSOs	Countries	Bands	Class C	Points	QSO	Countries	Bands
1. F6ACU	40	8	5	2	1. DK1RB	102	17	6	2
2. GSZJG	32	8	4	1	2. DK6ZW	90	15	6	2
3. LX1SW	16	4	4	2	3. DL8HAV	78	13	6	2
4. HB9BZY	15	5	3	2	4. DF7NF	40	8	5	2
5. F6CDX	15	5	3	1	5. G3VZX	35	7	5	1
5. DF0BUS	12	4	3	2	6. DL3LAT	30	6	5	1
6. EA4TI	8	4	2	1	7. DJ1QT	18	6	3	1
7. DL6LAG	4	2	2	1	8. ON8AG	15	5	3	1
8. DL2XP	1	1	1	1	9. DB4LM	4	4	1	0

Class B: No input
Checklog: DJ8BT

MIRAGE

American made RF Amplifiers and Watt/SWR Meters of exceptional value and performance.

•5 year warranty • prompt U.S. service and assistance

RF AMPLIFIERS

2 METERS-ALL MODE

B23 2W in=30W out $89.95
(useable in: 100 mW-5W)

B108 10W in=80W out $179.95
(1W=15W, 2W=30W) RX preamp

B1016 10W in=160W out $279.95
(1W=35W, 2W=90W) RX preamp

B3016 30W in=160W out $239.95
(useable in: 15-45W) RX preamp
(10W=100W)

220 MHz ALL MODE

C106 10W in=60W out $199.95
(1W=15W, 2W=30W) RX preamp

C1012 10W in=120W out $289.95
(2W=45W, 5W=90W) RX preamp

C22 2W in=20W out $89.95
(useable in: 200mW-5W)

RC-1 AMPLIFIER REMOTE CONTROL $24.95
Duplicates all switches, 18' cable

WATT/SWR METERS

- peak or average reading
- direct SWR reading

MP-1 (HF) 1.8-30 MHz
MP-2 (VHF) 50-200 MHz
$119.95

430-450 MHz ALL MODE

D24 2W in=40W out $199.95
(1W=25W)

D1010 10W in=100W out
(1W=25W, 2W=50W) $319.95

Available at local dealers throughout the world.

MIRAGE
COMMUNICATIONS EQUIPMENT, INC.

P.O. Box 1393, Gilroy, CA 95020 (408) 847-1857

See List of Advertisers on page 114

stations in each class with entries with reasonable scores.

LICENSING

As you may know, reciprocal licensing agreements exist between a number of countries and the Federal Republic of Germany. And it is interesting to know which choices you have to obtain a license in this country.

First, the class of license you may apply for: Class A requires something like a Novice or Technician ticket. It allows a maximum power output of 150 Watts or, alternatively, a rig with a maximum plate/collector dissipation (manufacturer's data) in the final amplifier of 50 Watts. You are allowed to operate from 3520–3600 kHz and 21090–21150 kHz in CW and RTTY and from 3600–3700 kHz in AM/SSB. From 28.0–29.7 MHz and 144-146 MHz you may use CW, AM/SSB, RTTY, and narrowband TV.

If you have something like a General or higher ticket, you may apply for a class B license. The power levels permitted are different for individual groups of bands and are indicated in the form of maximum power output/maximum plate or collector dissipation. The following bands are available: 1815-1835 kHz and 1850-1890 kHz for CW and 1832-1835 kHz for CW and SSB at a power level of 75/10 Watts, 3500–3800 kHz, 7000–7100 kHz, 14000–14350 kHz, 21000–21450 kHz, 28.0–29.7 MHz, and 144–146 MHz for CW, AM/SSB, RTTY, and narrowband TV at a power level of 750/150 Watts. The 10100–10150 kHz, 18068–18168 kHz, and 24890–24990 kHz bands are reserved for CW only at a power level of 150/50 Watts. The band subdivisions are governed by the IARU recommendations.

The class C license is a no-code license for 2 meters and up. No comparable counterpart exists in the US. However, amateurs from other countries with a similar license may apply for class C and enjoy AM/SSB, RTTY, and narrowband TV on these bands.

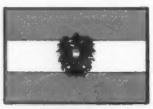
There are several ways to apply. If you are visiting the country for a period of up to 3 months only, you should apply for a license through the German Amateur Radio Association (Deutscher Amateur Radio Club e.V. (DARC), Postfach 1155, 3507 Baunatal 1, Federal Republic of Germany). No particular forms are required but you should state your nationality, full name, date and location of birth, home address, domestic call and class of license, membership in an amateur radio association if applicable, the 3-month period for which a license is desired, your address in Germany and/or the license plate number of your car, a copy of your domestic license, a statement that you have transferred the fee of DM 15.00 to DARC, and a mailing address for your German license after issuance. The DARC will check your application and forward it to the responsible directorate (Oberpostdirektion Duesseldorf) of the German Department of Telecommunications. After 4–6 weeks you will get your license from there with a call like DH/W8XYZ for class A or DL/W8XYZ for class B.

In case you are a civilian staying in Germany for more than 3 months, the procedure is different but not much more difficult. You have to apply directly to the directorate of the Department of Telecommunications of the state you are living in. They will send you the appropriate form on request. But as you have to present a residence permit and a certificate of good conduct, you should be living in the country already before writing your application. Your call will be taken from the DJ0AAA–DJ0ZZZ block with a two- or or three-letter suffix. The annual fee is DM 36.00 (about $15.00).

All applications by military personnel have to be addressed to the responsible section of your unit, which will get in touch with the German Department of Telecommunications directly and provide you with all the information you need. You will be assigned a callsign from the DA1AA–DA2ZZ block.

This is a very brief run-down of what you may expect when applying for a license in Germany. Of course, there is much more in store like operation above 2 meters, getting a license if you have no domestic license, using broadband TV or telecommand modes and so on. These and other topics are covered in full detail in the brochure *Bestimmungen ueber den Amateurfunkdienst* which is much more elaborate than its translations *(Regulations Concerning the Amateur Service* or *Reglement relatif au service d'amateur*). Copies may be obtained from the Bundesministerium fuer das Post und Fernmeldewesen, 5300 Bonn 1, Federal Republic of Germany.

But best of all: On special events, like international radio amateur conventions in Germany, you may get a license on-site, free of charge, without filling in special forms, and good for 1 week. So have your domestic license always handy when you visit Germany and enjoy some of the most liberal amateur radio regulations in the world.



AUSTRIA

Dr. Ronald Eisenwagner OE3REB
PO Box 999
A-1014 Vienna
Austria

Austria, located in the central part of Europe, has today about 4500 radio amateurs. There is one big society, the OVSV (Osterreichischer Versuchssenderverband), which is a member of the IARU, Region 1. A good 4200 of these radio amateurs are members of the OVSV. The activity is very varied. There are about 40% with permission to operate on all bands; real DX activity is poor. Not more than 200 amateurs can be heard in international traffic and most of the operators can be heard only on the repeaters.

We have two different types of licenses in Austria; one is a General license, which gives the owner the permission to work on all bands and in all modes. For this license, one needs to pass a CW examination at 12 wpm. The other type of license (without a CW examination) gives the possibility to work 144 MHz and above, phone and RTTY only. Repeater activity is big, especially in and around bigger cities such as Vienna, Linz, Salzburg, Innsbruck, and Graz. There are more than 25 repeaters for 2m and a good 15 for 70cm in operation, but as elsewhere, the activity is great only in the morning and evening hours and on weekends. There are some groups with SSB and CW activity on the UHF bands, too, but only a very few are operating in the EME circuits.

Hearing an Austrian can tell you some information as soon as the call is recognized. The number (1 up to 9) tells you the area from which the station is transmitting. OE1 = Vienna, OE2 = Salzburg, OE3 = Lower Austria, OE4 = Burgenland, OE5 = Upper Austria, OE6 = Steiermark, OE7 = Tirol, OE8 = Karnten, and OE9 = Vorarlberg. The number 0 is not used currently. Normally, the first part of the call is followed by two or three letters. Each letter combination can be found only once in Austria! The administration has put out three-letter calls in the last 15 years, so the owners of two-letter calls have been radio amateurs at least 17 years! For special purposes, the first letter can give further information: X stands for a club station (e.g., OE1XA, the club station of the OVSV, district Vienna), Y for a young lady, and Z for a guest license with permission to operate for more than three months. If a station is portable, it has to put on the end of the call the area locator (e.g., OE1XA/3). For short-time guest licenses one takes one's own call and adds OE on the end (e.g., WB2VMM/OE). No problem to get a guest license, but please keep in mind that everything needs time here, hi!

The technical activities are very varied. There are still many putting together their own gear, or at least parts of it, but most Austrians prefer to walk around the corner and buy the rig. There is not a broad variety of equipment on the market, but one can get nearly every station. Most of the boys are using Japanese gear, but there are also a good number of Drake users. Collins is well known but rather expensive, so one finds only some older models; haven't heard of a new KWM380 in use here.

A whole variety of antennas is in use—mostly Fritzel from Germany, but also Hy-Gain, and some of the top DXers are riding on KLM and more expensive beams. There is not too much antenna home-brewing; most prefer to buy one and put it up! As 99% of the amateurs are limited in space one does not find special antennas for the low bands (and you will find few OEs on 160 and 80). There is no rotatable 80m beam in action here and only a few 2el for 40 from Hy-Gain. So for the low bands one prefers dipoles, verticals, and some forms of longwires. As we are also limited in power, it is a rather difficult job to be in a DX fight!

Presently, the upper limit for personal calls is 400 W HF power output. Club stations are allowed to run 1-kW output. With a new regulation, it is possible to own commercial linears such as the L4B, L7, SB200, and SB220. Before, when we had been limited to 100 W anode dissipation power, most of the linears had been home-brew ones with 4 to 6 TV tubes in them (or a black box below the table, hi). That time is over now, and we hope that with final new regulations, which are expected at the end of 1983, we will be allowed to run 1 kW.

The connection to our PTT is everything between very good and "like a family," but as a good father does with his children, they keep an eye on us! Being on the wrong way can cost some $50 to $100 and in some cases one can lose the license altogether (hasn't happened in recent years).

SWEDEN

Rune Wande SM0COP
Frejavagen 10
S-155 00 Nykvarn
Sweden

Amateur radio is unique in its way of bringing people from all over the world together on a man-to-man communication basis. We feel like we know each other very well thanks to our common interest. Although the amateur radio regulations in all countries are based on the same international ITU regulations, amateurs in various countries are facing different laws. Most of us are not aware of these differences.

This new section will cover amateur radio in Sweden mainly, but being so closely related to the other Scandinavian countries historically and linguistically, news concerning laws and operations in Denmark and Norway will also be dealt with—and also Finland.

In a wider sense, one can talk about the Nordic countries all together and include more or less exotic prefixes like JW, JX, JY, OX, OY, FT, and even 3Y Bouvet in the South Atlantic Ocean. All of these are in some way related to either Denmark or Norway and usually have similar regulations for ham radio.

That there still are considerable differences among these countries, however, has become obvious by the efforts made to institute a common Nordic License. Apart from the sensitive east-west relations because of our geographical location, there are other factors causing difficulties in achieving this. Sweden has four classes of licenses, while the others have only two. Denmark, Finland, and Norway require a code proficiency of 12 wpm for their highest class of license while Sweden requires 16 wpm. Sweden has one class of license for VHF/UHF without code requirement; this is different from the other countries. Finland does not allow mobile operation by a foreigner operating from there. The new WARC bands have been opened for the other countries, but all that Sweden has opened so far is 15 kHz on the 160m band with 10 W input from April 1, 1982. There also are different maximum power levels in these countries. Finland has a maximum power level of 600 Watts output compared to 500 Watts dc input in Sweden.

Today a reciprocal license has to be applied for and a license fee paid when visiting a neighboring country. A reciprocal license in most European countries is valid only for three months per calendar year, and processing time can be over three months long. In a future column I will give specific information on how to apply for reciprocal licenses in Scandinavia and in Finland.

The Swedish Telecommunications Commission (Televerket) has just recently revised our amateur regulations. In a coming column I will tell about the requirements for obtaining a ham license in Sweden and make comparisons with the other countries. I will talk also about the privileges we have and make comparisons with yours in North America.

MULTI-BAND SLOPERS
160, 80, and 40 meters
Outstanding DX performance of slopers is well known. Now you can enjoy 2 or 3 band BIG-SIGNAL reports! Automatic bandswitching • Very low SWR • Coax feed • 2kw power • Compact • Ground or tower feed • Hang from any support 25 ft. high or higher • Easy to install • Very low profile • Complete instructions • Immediate shipment • Check ok

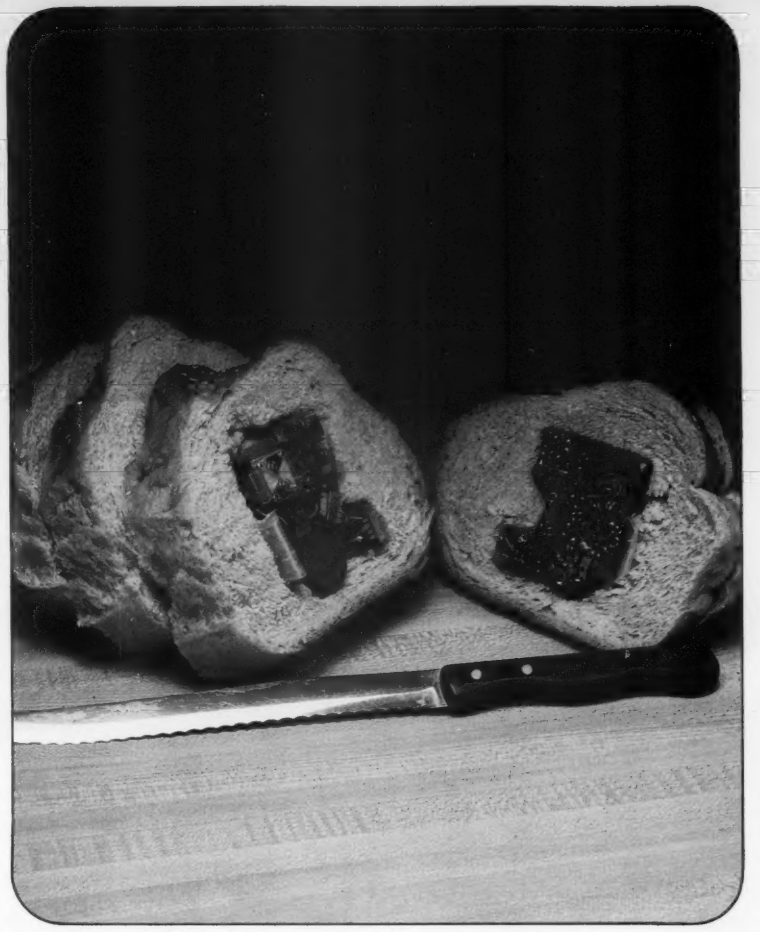
3 BAND SLOPER· 160, 80, & 40 Meters· 60 ft. long	$ 43.00 frt.ppd.
2 BAND SLOPER· 80 & 40 Meters · 41 ft. long	$ 30.00 frt.ppd.
3-BAND NO TRAP DIPOLE, 160, 80, & 40M · 113 ft. long	$ 66.00 frt.ppd.
2-BAND NO TRAP DIPOLE, 80, & 40M · 84 ft. long	$ 49.00 frt.ppd.

FOR ADDN'L INFO on these and other unique antennas: send SASE
W9INN ANTENNAS
BOX 393-S MT. PROSPECT, IL 60056

Electronics Made Easy

For Your Computer

the electronic breadboard



With The Electronic Breadboard you can:

- *Test and analyze any analog circuit, such as transmitting and receiving equipment, amplifiers and the like.
- *Add or remove components.
- *Calculate impedance at a specific point.
- *Obtain voltage at a specific point (or at all points).
- *Save circuit designs on cassette tape.
- *Determine causes of circuit failure, reducing time spent troubleshooting.
- *Evaluate the frequency response of any circuit.
- *Learn and verify electronic theory by entering sample circuits.

The Electronic Breadboard program is ideal for:

- *Audio component repairmen
- *Ham radio technicians
- *Hobbyists
- *Electrical engineers
- *Telecommunications engineers
- *Audiophiles
- *Students of electronics

Requires:
***TRS-80 Tape MOD I & MOD III 16K #0287R**
TRS-80 Disk MOD I & MOD III 32K #0222RD
****APPLE Disk Applesoft 32K #0428AD**

If you're an electronic doughboy, then you need this breadboard. Order yours today. Use the coupon or call toll free:

1-800-258-5473

Instant Software.
The best software under the sun.

*TRS-80 is a trademark of the Radio Shack division of Tandy Corp.

**Apple is a registered trademark of Apple Computer Inc.

Yes! I want Electronics made easy—send me:
_____copies of #0287R @ $49.95
_____copies of #0222RD @ $59.95
_____copies of #0428AD @ $59.95

Please add $2.50 for postage and handling

___VISA
___MC
___AMEX
___CHECK/MO

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CARD# _____ EXP. DATE _____

SIGNATURE _____

Instant Software™

Rte. 101 and Elm Street,
Peterborough, N.H. 03458

1-800-258-5473

334B6E

Interface Your Personal Computer RTTY Now for Only $79.95*

Your personal computer can now talk to the world in Baudot or ASCII, even with heavy QSB and QRN! Your HTY 170 is easy to use and is ready to start sending and receiving messages as soon as it is installed.
Your HTY 170 is TTL or RS232 Bus Compatible, with 170 Hz Shift @ 110 Baud

MHco ↙237
3080 Olcott Street 120C
Santa Clara, California 95050
408/727-7999

* Kit form $79.95. For an assembled unit send your check for $125.00 (California residents add 6½% sales tax) to MHco 3080 Olcott Street, 120C, Santa Clara, California 95050. VISA and MasterCard orders also accepted-for faster delivery call 408/727-7999

TIME-DUAL TONE DECODER $15

The LJM2RK decoder kit converts your receiver into a special receiver or control. When a user-selected time-tone combination is received, the output provides a relay control for activating speakers or other devices.

INPUT: Audio from transceiver, scanner, etc.
OUTPUT: SPST (N.O.) relay.

FEATURES: Single or dual tones adjustable over the T/T range • Adjustable time delay • Relay output • Manual or auto reset • Single tone ON latching with different single tone reset OFF • Operates on 12VDC • Interfacing of multiple boards for multi-digit sequential activation and reset.

APPLICATIONS: Call-up system • Repeater or commercial controls • Etc. limited only to your imagination • Write for information on the LJM2RK for your application.

LJM2RK decoder kit includes all component, relay, and P.C. Board. . . . $15 plus $1.50 shipping.

LJM2RC enclosure kit includes molded case, speaker, input cable. . . .$5 plus $1.50 shipping.

24 HR.-DATE LCD CLOCK $15

INCLUDES FREE LIFETIME BATTERY REPLACEMENT
LCD-24 Clock. . . .$15 plus $1.50 Shipping.

THE METHENY CORPORATION
204 Sunrise Drive, Madison, IN 47250 ↙205

POWER LINE PROBLEMS?

SPIKE-SPIKER® ...THE SOLUTION

Protects, organizes, controls computers & sensitive electronic equipment. Helps prevent software "glitches", unexplained memory loss, and equipment damage. Filter models attenuate conducted RF interference. 120V, 15 Amps. Other models available. Ask for free literature.

DELUXE POWER CONSOLE $79.95
Transient absorber, dual 5-stage filter. 8 individually switched sockets, fused, main switch, & lite.

QUAD-II $59.95
Transient absorber. Dual 3 stage filter. 4 sockets, lite.

QUAD-I $49.95
Transient absorber, 4 sockets.

MINI-II $44.95
Transient absorber, 3 stage filter, 2 sockets.

MINI-I $34.95
Transient absorber, 2 sockets.

KAGLO® ↙212
6584 Ruch Rd., Dept. 73
Bethlehem, PA 18017

215-837-0700
Out of State Order Toll Free
800-523-9685

DEALER INQUIRIES INVITED • CODs add $3.00 + Ship.

Touch-Tone Control

Ask for your FREE copy of the catalog describing the newest line of Touch-Tone control equipment from Palomar Engineers.

- Single digit decoders from $77.50.
- Sixteen digit decoders featuring crystal control from $149.50.
- Encoders from $55.00.
- Additional modules to complete your system also available.

Why pay more and get less when you can have the finest products available from Palomar Engineers.

For technical information and price quotations please contact:

Palomar Engineers

1924-F W. Mission Road
Escondido, CA 92025
Phone: (619) 747-3343

CES INTRODUCES THE NEW 510SA "SMART PATCH"

The State of the Art Simplex Interconnect

Communications Electronics Specialties introduces the CES 510SA "Smart" Simplex Autopatch, with many important new features never available before. • Three digit control codes with user programming. • A sophisticated toll restrict provides positive long distance lock out. • Time-out and COR activity timers with warning beeps and digital programming. • Rotary or DTMF dialing. • Phone line in-use detector prevents interrupting a call in progress, and sends unique CW sequence. • Phone ring detection logic enables unique CW sequence. • Digital programming of the sample rate and width, and noise gate sensitivity control, for easy interfacing with most radios. Simple and direct connections to radio.

Options available: • Smart CW identifier with unique CW messages for each patch function. • FCC type accepted phone line coupler. • Special tone squelch kit to operate patch through repeaters.

CES

The 510SA—the newest advance in interconnect technology, from the innovators at:
Communications Electronics Specialties, Inc.
Post Office Box 507 • Winter Park, Florida 32790
(305) 645-0474 • Toll-free (for orders only): (800) 327-9956 462

The New Plus in Mobile Radio

Universal Communications is offering to you **Wilson's Citi-Com Plus**, the most versatile mobile radio ever designed. This 10 channel VHF synthesized radio is complete with scanning.

It's everything you'll ever need in a 10 channel VHF transceiver. For pricing and more information write or call Universal Communications.

1691 WEATHER FAX DOWNCONVERTER NOW AVAILABLE PLEASE CALL OR WRITE FOR DETAILS

KIT 1 $49.95
SAVE $10.00

DOWNCONVERTER	$19.95
VARIABLE POWER SUPPLY	$19.95
CIGAR ANTENNA	$19.95
SUPERVERTER I assembled only (crystal not included)	$109.95

KIT 2 $79.95
SAVE $7.90

DOWNCONVERTER	$19.95
VARIABLE POWER SUPPLY	$19.95
KD 44 DISH ANTENNA	$47.95
SELECTIVE PREAMPLIFIER	$26.95
DRIFT MODIFICATION	$1.25

ASSMBLD SPECIAL $79.95
SAVE $10.00

ASSEMBLED DOWNCONVERTER	$39.95
ASSEMBLED VARIABLE POWER SUPPLY	$29.95
CIGAR ANTENNA	$19.95
HIGH GAIN TRANSISTOR	$6.95
KD44 DISH ANTENNA	$47.95

For Information, Ordering or a Product Brochure contact

217 UNIVERSAL COMMUNICATIONS
A DIVISION OF INNOVATIVE LABS, INC.
P.O. Box 339 • ARLINGTON, TEXAS 76010-0339 • (817) 860-1641 Metro (817) 265-6638

See List of Advertisers on page 114

DIRECTION FINDING?

- ★ Doppler Direction Finding
- ★ No Receiver Mods
- ★ Mobile or Fixed
- ★ Kits or Assembled Units
- ★ 135-165 MHz Standard Range

- ★ Circular LED Display
- ★ Optional Digital Display
- ★ Optional Serial Interface
- ★ 12 VDC Operation
- ★ 90 Day Warranty

New Technology (patent pending) converts any VHF FM receiver into an advanced Doppler Direction Finder. Simply plug into receiver's antenna and external speaker jacks. Use any four omnidirectional antennas. Low noise, high sensitivity for weak signal detection. Kits from $270. Assembled units and antennas also available. Call or write for full details and prices.

DOPPLER SYSTEMS, 5540 E. Charter Oak, Scottsdale, AZ 85254 (602) 998-1151 ✓425

RF POWER

ONE BILLION WATTS IN STOCK

Your One Stop Source for RF Power Tubes and Transistors

TUBE SPECIALS

3-400Z	$100.00	6MJ6 (SYL)	$ 7.28	5894B	$ 59.00	8874	$206.00
3-500Z	95.00	12BY7A	2.55	6146B	7.95	8875	206.00
3-1000Z	368.00	572B	46.00	6146W	15.00	8908	13.00
4CX250B	65.00	811A	11.00	8122	115.00	8950	13.00
6LF6	5.99						

RF TRANSISTORS

SPECIAL — MICROWAVE 1.00 SPECIALS — While they last

MRF901	House Marked 852 4 Lead	1.00	NEC73436	JAP 3 Lead MRF901	1.00
MRF901	House Marked 854 3 Lead	1.00	NEC NEO2136		1.00

2-30 Mhz

RF43,RF33 (Premium Replacements for MRF455 & MRF455A)	(RFG)	70W	12.5V		15.00
CD2545	(CTC)	50W	12.5V	Flange	24.00
CD3424	(CTC)	60W	12.5V	Flange	24.00
SD1451	(SSM)	60W	12.5V	Flange	15.00
SD1076	(SSM)	80W	12.5V	Flange	19.88
RF85	(RFG)	80W	12.5V	Flange	17.50
MRF458	(MOTO)	80W	12.5V	Flange	19.88

VHF 150-175 Mhz

						UHF 450-512MHZ					
B40-12	(CTC)	40W	12.5V	Stud	19.35						
2N5591	(SSM)	25W	12.5V	Stud	9.50						
2N6083	(SSM)	25W	12.5V	Stud	9.95						
2N6097	(SSM)	40WPNP	12.5V	Flange	15.95	2N5946	(SSM)	10W	12.5V	Stud	12.95
SD1416	(SSM)	70W	12.5V	Flange	31.00	MHW710-2	(MOTO)	13W	12.5V	Module 19 db Gain	59.00
987	(MRF559)	.5W	12.5V	13db	1.00	CM60-12A	(CTC)	60W	12.5V	Flange	42.95

MINIMUM ORDER $30.00 **Add $3.00 for UPS charges**

CALL TOLL-FREE 800-645-2322

(N.Y. State 516-536-8868)

R F Gain, Ltd.

Export And Dealer Inquiries Invited Call for Types Not Listed

100 Merrick Road Rockville Centre, New York 11570

TWX 510-225-7508 ✓42

Homebrew Headquarters

PROJECT PACKS*

DIRECT from ENGLAND

2 Meter Converter R & EW 10/81
Low noise 144-146 to 28-30 MHz MOSFET Converter

2 Meter Pre-Amp. R & EW 4/82
Gain 22 db, BW 6 MHz, NF > 1.5 db, Z_i/Z_o 50 Ω

2 Meter GaAs Pre-Amp. (Mast Head Mount w R/T relay) R & EW 10/82
Gain 17 db, BW 6 MHz, NF > 1.0 db Z_i/Z_o 50Ω

UHF (70 CM) Converter R & EW 11/81
Low noise 432-434 to 28-30 MHz MOSFET Converter

UHF (70 CM) Pre-Amp. R & EW 3/82
Gain 13 db, BW 20 MHz, NF > 2 db, Z_i/Z_o 50 Ω

23 CM Converter R & EW 3/82
Low Noise 1240-1325 MHz to 2 or 10 Meter Converter

Air Band Receiver R & EW 9-10/82
108-136 MHz, 720 Channel Synthesized VHF AM Receiver

FET Dip Oscillator Rad Com 11/81
1.6 - 215 MHz (includes tone dip feature)

*US Distributor for RADIO & ELECTRONIC WORLD

SEE THEM AT DAYTON

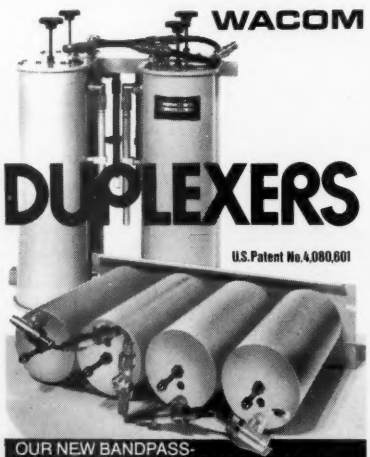
Catalog 50 cents

RADIOKIT

Box 411S, Greenville, NH 03048

(603) 878-1033 ✓454

WACOM



DUPLEXERS

U.S.Patent No.4,080,601

OUR NEW BANDPASS-REJECT DUPLEXERS WITH EXCLUSIVE

B_pB_r CIRCUIT FILTERS®

. . . provides superior performance, especially at close frequency spacing.

Models available for all commercial and ham bands. Special prices for amateur repeator clubs.

✓79

WACOM PRODUCTS, INC.

P.O. BOX 7127 • WACO, TEXAS 76710

817/848-4435

Pat Williams W4HJW
3575 Arizona Drive
Pensacola FL 32503

The Florida T-R Switch

Get your 2m amplifier out of the way—without a relay.

I had quite a bit of fun being QRP mobile with my TR-2200A and a quarter-wave whip; it's amazing how little power you need to work into the repeaters and even to work simplex. However, it is quite frustrating to need to get out and not be able to. I was, therefore, very interested in the two articles that appeared in *73* (November, 1977 and December, 1977) describing how to build a small amplifier using any of a number of available transistors.

I chose to build the WA2INM variety, but without the COR. The amplifier worked great (getting about 10 Watts out with two Watts input), but no means existed for T-R switching.

A variation of the scheme in W4MNW's design was tried and it worked great. This amounted to the addition of two 1/4 wavelengths of RG-174 as shown in Fig. 1. When receiving, the low level rf is below the threshold to cause the diodes to conduct, so there is a direct path from the antenna to the receiver around the amplifier. Any attenuation from shunting is negligible since the impedance of the tuned circuits is sufficiently high. When transmitting, the high level rf causes the diodes to conduct, which produces a short at the midpoint. The impedance one-quarter wavelength away from a short is high; therefore, the rf passes through the amplifier to the antenna. No T-R switching was used for the 12-volt supply since the amplifier operates class C and no current is drawn until it is excited. A power switch should be provided to apply the 12 V dc, however. The basic construction is still identical to the original amplifier.

Both Jim WA4GND and I have been using one of these units for quite a while and have had excellent results. There has been no noticeable degradation of receiver sensitivity with the diode switching arrangement, and it sure beats having to repeat the call several times. ■

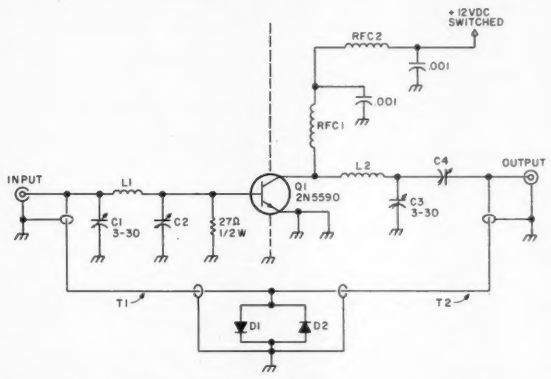


Fig. 1. Amplifier schematic. C2—68 pF mica in parallel with 7-45 pF trimmer; C4—7-45 pF trimmer; D1,D2—1N914; L1,L2—2-1/2 T, #22 solid wire, 1/4" dia., spaced 3/4"; RFC1, RFC2—approx. 6 T #22 PE, 1/4" dia., close-spaced; T1,T2—1/4λ, RG-174 (approx. 13-1/2").

COMPARE the HAZER™
with foldover + telescoping towers

- Antenna systems mount on Hazer-Hazer follows parallel to outside of tower - Raise to tower top or lower completely to ground level.
- Safety lock system on Hazer operates while raising-lowering & in normal position. Never can fall.
- Weight transferred directly to tower. Winch cable used only for raising & lowering.
- Will support most antenna arrays up to 20 sq. ft.
- High quality materials & workmanship
- Safety - speed - convenience - smooth travel
- Ease to install and use
- For Rohn 20 & 25 tower — Other towers on request
  Complete with winch, 100 ft. of cable, hardware and instructions.

HAZER II Heavy alum. $279.95 + $17.00 UPS
HAZER III Standard alum. $199.95 + $13.00 UPS
HAZER IV Heavy gal. steel $249.95 + $28.00 UPS
Specify mast diameter when ordering.

MARTIN ENGINEERING P.O. BOX 253 BOONVILLE, MO 65233
✓134 816-882-2734

2 GHz Microwave Receiving Systems

The new **Micro-System** features a machined 18" parabolic reflector for maximum efficiency, a linear feed-point downconverter with ceramic high performance RF preamplifier transistor, a variable 12 to 18 volt regulated power supply and 50' of 75Ω coaxial downlead, including a 3' jumper and matching transformer. The **Micro-System** includes a full 6 month warranty.

Micro-System (MS-021) $159.95
Micro-System (MS-578) $169.95
Micro-System (MS-645) $179.95
Shipping & Handling: USA...$4.00 AK, HI & PR...$10.00

Data Service Company 612-636-9469
✓346 3110 Evelyn Street
Roseville, MN • 55113

✓See List of Advertisers on page 114

Build the Deadeye Dish Controller

Tired of taking potshots at satellites? With the flick of a switch, this easy-to-build rotator will hit the bull's-eye every time.

Lindsey Riddle W5JC
5646 Bellaire Drive
New Orleans LA 70124

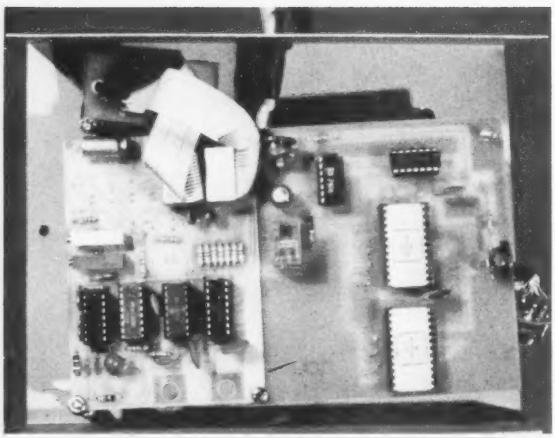


Photo A. Interior view of the cabinet, showing the Motorola kit and the control board.

Want to stop your TVRO dish on a chosen satellite with a minimum amount of effort? With this system the dish can be changed many times during an evening of viewing without requiring you to get out of your chair.

It is possible with a properly aligned polar mount and dish to swing the dish through a complete orbit (horizon to horizon) and stay properly lined up. (See *Coop's Satellite Digest*, June, 1981, "Polar Mount For All Seasons.") To accomplish this, the BCD (Binary Coded Decimal) of an analog-to-decimal converter (A/D) that is used to show a relative digital readout of the position of the dish is used to open the holding contacts of a relay when the readout of a chosen satellite comes up.

For quite some time, I had been looking for a simple A/D converter that would show the look angle of a

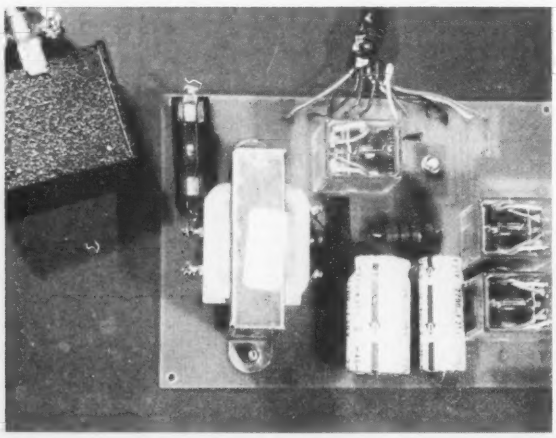


Photo B. The power supply and cable.

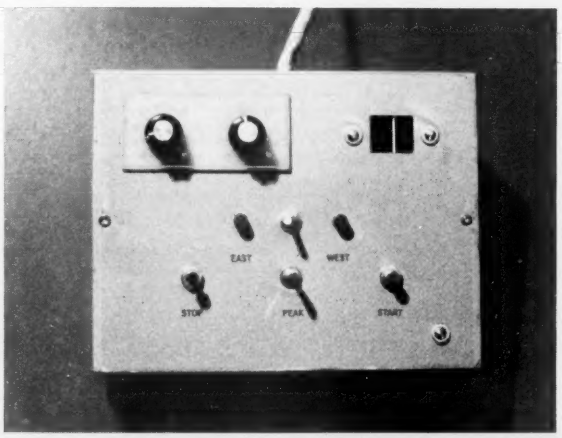


Photo C. Dish control cabinet.

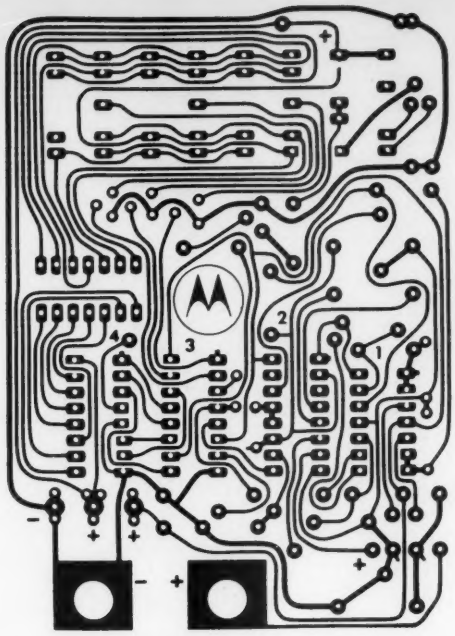


Fig. 1. Motorola PC board (foil side).

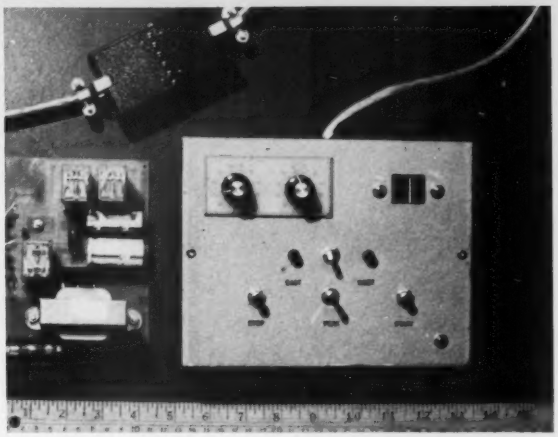


Photo D. Cabinet, power supply, and connector.

dish while allowing the BCDs to be available to control relays, etc. The Motorola 3½-digit voltmeter talking kit had all these features except that it was a strobed unit and I was unable to find a method to interface it to a relay. The unit was sent to Ira Miller of Motorola, and he and Joe Carbaico came up with a strobed BCD-to-line driver (MC 14514) that would allow this to be accomplished.

This article was completed and almost ready to be sent in when disaster struck. It was discovered that the kit had been discontinued. Upon checking with Motorola, I found out that all parts were available except the circuit board. Luckily, I had one on hand, and it was possible to make a film negative. The kit included only the board and the four ICs. The chips are now available from Circuit Specialists, Box 3047, Scottsdale AZ 85257 (MC 3403P, $1.30; MC 1405L, $8.95; MC 14435, $5.95; MC 14511, $1.44). Fig. 1 shows the one-sided board; it measures 2⅞" × 3 15/16".

Theory of Operation

Potentiometer 1 (Fig. 3) is

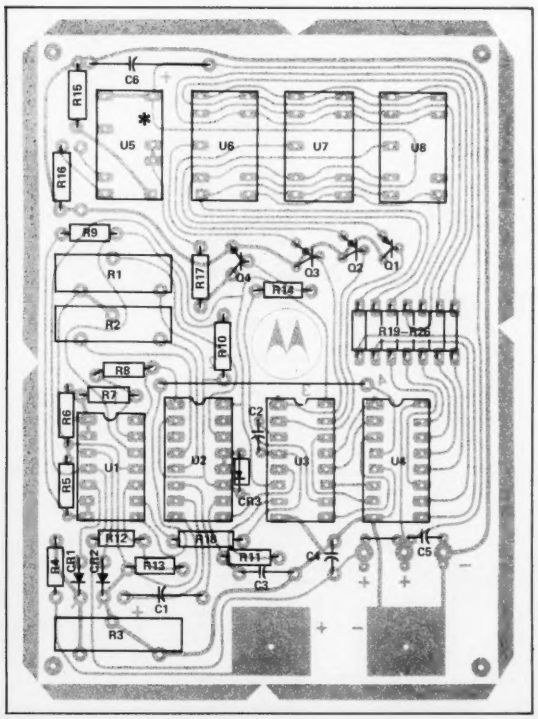


Fig. 2(a). Motorola PC board (component side).

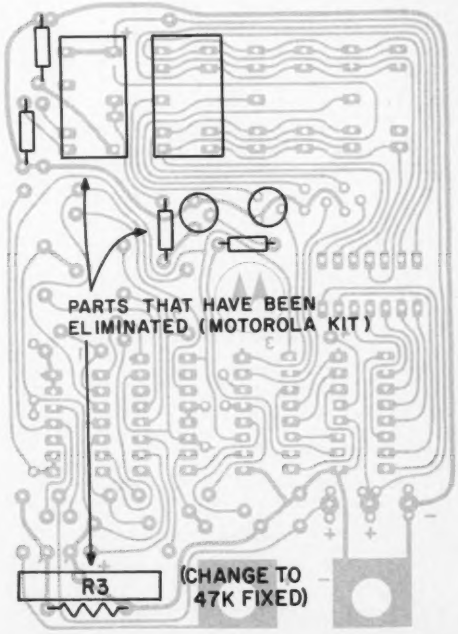


Fig. 2(b). Component side of the Motorola board showing which parts are not used.

mounted so that it turns with the dish and feeds a small varying voltage to the A/D converter; the converter gives a relative readout of the position of the dish. The BCD of the converter is tapped and fed to two MC 14514s (U9, U10)—a 4-bit latch-to-line driver. The converter is not disturbed by this and operates in a normal fashion. A 14514 will take a BCD signal at its input and come out with a pulse on the proper output. It has 10 outputs, so with a 10-position switch it is possible to select any number from 0 to 9. With two 14514s and two switches (SW1, SW2), we can select any number from 0 to 99.

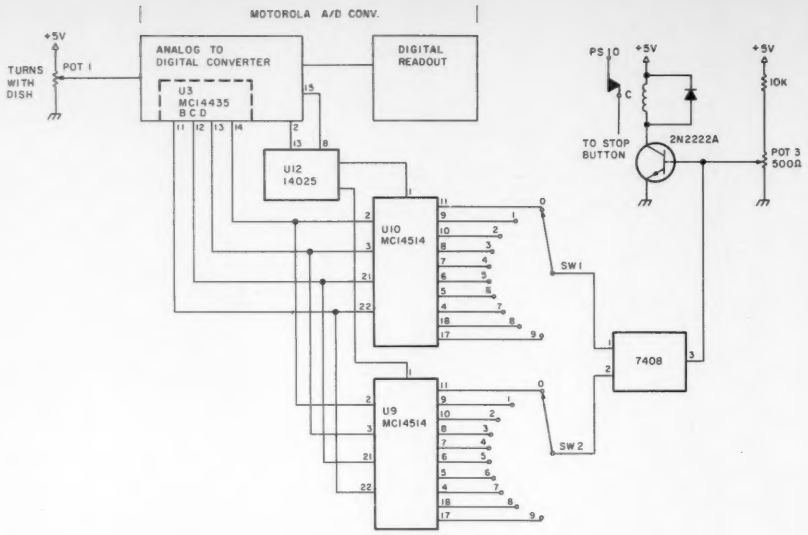


Fig. 3. Theory of operation.

The outputs of the two switches are fed to the two inputs of a 7408 (U11, 2-input positive AND gate). There will be an output pulse of the 7408 only when there are pulses present at both inputs at the same time. When the 7408 has an output pulse it will trigger the 2N2222A causing Relay 4 to open; that breaks the return ground of holding Relay 1 and kills the power to the motor that is turning the dish. The 14025 (U12) takes

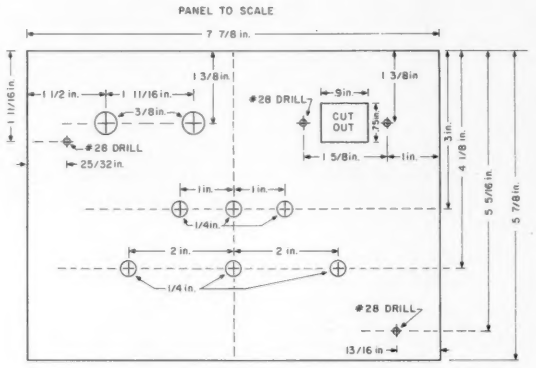


Fig. 4. Front panel layout.

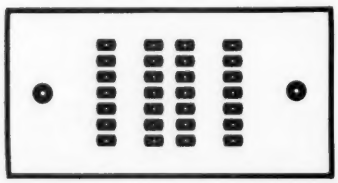


Fig. 5. Etched board for mounting the two MAN 74 readouts on the front panel.

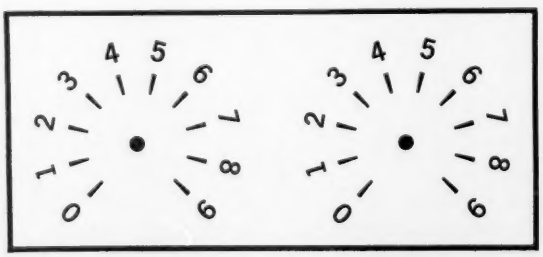


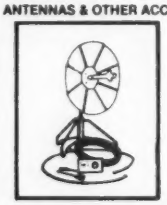
Fig. 6. Etched plate to show the positions of SW1 and SW2.

HAL'S SHOPPER'S GUIDE

HAL 2304 MHz DOWN CONVERTERS (FREQ. RANGE 2000/2500 MHz)
2304 MODEL #1 KIT BASIC UNIT W/PREAMP LESS HOUSING & FITTINGS . . . **$19.95**
2304 MODEL #2 KIT (with preamp) . . . **$29.95**
2304 MODEL #3 KIT (with High Gain preamp) . . . **$39.95**

MODELS 2 & 3 WITH COAX FITTINGS IN & OUT AND WITH WEATHER-PROOFED DIE CAST HOUSINGS

BASIC POWER SUPPLY . . . **$19.95**
POWER SUPPLY KIT FOR ABOVE WITH CASE . . . **$24.95**
ANTENNAS & OTHER ACCESSORIES AVAILABLE. SEND FOR MORE INFO.



2100-2500 MHZ
*HMR-II COMPLETE UNIT
COMPLETE SYSTEM AS SHOWN. *NOT A KIT.* INCLUDES A PC BOARD, POWER SUPPLY, CABLES & CONNECTORS—PRE-ASSEMBLED AND TESTED. 24dB GAIN OR GREATER.
1 UNIT . . . **$149.95**
2 UNITS . . . **$139.95 ea.**
3 OR MORE UNITS . . . **$129.95 ea.**
*HAM MICROWAVE RECEIVER

PRE-SCALER KITS
HAL 300 PRE (Pre-drilled G-10 board and all components) . . . **$14.95**
HAL 300 A/PRE (Same as above but with preamp) . . . **$24.95**
HAL 600 PRE (Pre-drilled G-10 board and all components) . . . **$29.95**
HAL 600 A/PRE (same as above but with preamp) . . . **$39.95**

PRE-AMPLIFIER
HAL-PA-19 WIDE BAND PRE-AMPLIFIER, 2-200 MHz BANDWIDTH (– 3dB POINTS), 19dB GAIN **FULLY ASSEMBLED AND TESTED $8.95**
HAL-PA-1.4 WIDE BAND PRE-AMPLIFIER, 10 MHz TO 1.4 GHz 12dB GAIN **FULLY ASSEMBLED $12.95**
HAL-PA-2.1 GHz 2 STAGE PRE-AMPLIFIER, DESIGNED FOR 2304 DOWN CONVERTER. MADE TO PIGGIE-BACK ON THE 2304 BOARD. OFFERS 20 dB GAIN. ALSO HAS AN IMAGE REJECTION FILTER.

SHIPPING INFORMATION: ORDERS OVER $25 WILL BE SHIPPED POST-PAID EXCEPT ON ITEMS WHERE ADDITIONAL CHARGES ARE REQUESTED. ON ORDERS LESS THAN $25, PLEASE INCLUDE ADDITIONAL $2.50 FOR HANDLING AND MAILING CHARGES. SEND 20¢ STAMP FOR FREE FLYER. *SEE YOU AT DAYTON—TABLE #9*

HAL-TRONIX INC.
P.O. BOX 1101
SOUTHGATE, MICH. 48195
PHONE (313) 285-1782 ⌐31

"HAL" HAROLD C. NOWLAND
W8ZXH

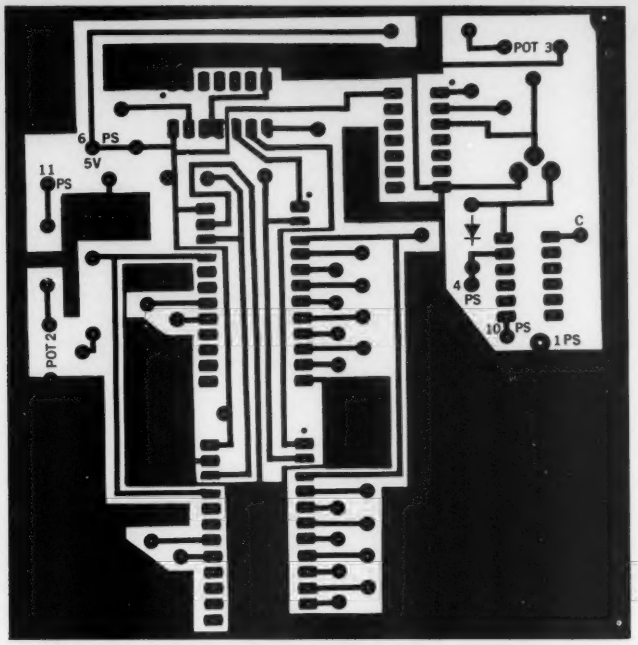


Fig. 7. Control PC board (foil side).

the strobe of the 14435 and turns on the line drivers at the proper time.

Construction

The unit is constructed in a Radio Shack cabinet. Unfortunately, this is a steel cabinet and is hard to work with. Fig. 4 shows the layout of the panel. The panel holds the switches 1 through 6, two LEDs (east and west), and the two MAN 74 readouts (U7, U8). The readouts are mounted on a PC board that should be etched for this purpose (Fig. 5). The board should be mounted on the panel with 6-32 bolts, so the readouts can be made flush with the panel.

Plug-in DIP jumpers can be used to extend the readouts to the board. A double 14-pin DIP jumper with 12 inches of ribbon cable can be cut in the middle, giving six inches for each readout. Since it is necessary to extend only 10 leads for each readout, small flexible wire could also be used with headers. For SW1 and SW2, small wire is better than ribbon wire. Leave enough slack so that the panel can be turned back for servicing. Fig. 6 is for an etched board that marks the positions of the switches.

The A/D and the control board (Fig. 7) are joined together with a couple of 4-40 bolts. The A/D board should be on top to eliminate any chance of a short. Before the boards are mounted in the cabinet, the following wiring should be done: The four BCD outputs of the MC 14435 (U3) must be connected to the already-paralleled inputs of the 14514s (see Fig. 13). Number 2 pins should connect to pin 14 of the 14435, #3 pins to 13, #21 pins to 12, and #22 pins to 11.

To strobe, pin 13 of the 14025 (U12) should be connected to pin 2 and pin 8 should be connected to pin 15; by reversing, these two lines will change the order of SW1 and SW2. The wires for these switches should be connected before the board is mounted. The boards should be grounded to each other, and the 5 V extended from PS6 to the A/D 5-V in.

Relay 4 fits into a 12-pin socket, so a couple of pins can be ground off a 14-pin socket. Some kind of marking should be put on the relay and socket since the relay is not marked. It is difficult to plug the 24-pin ICs in-

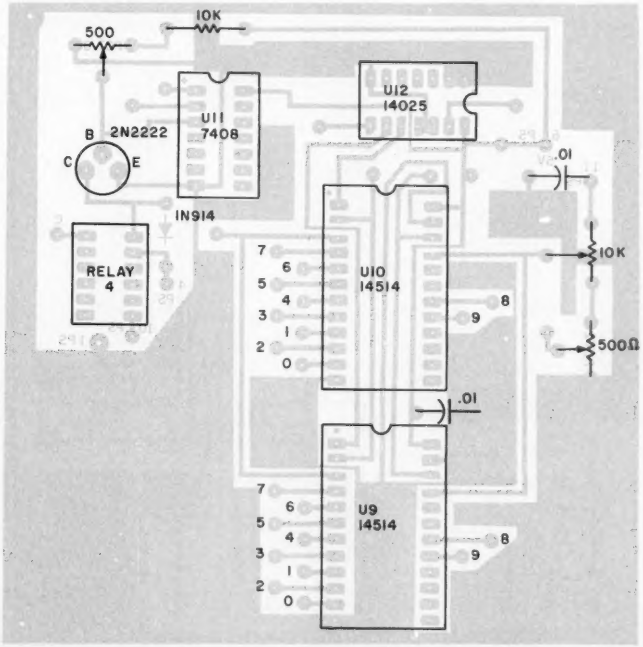


Fig. 8. Control PC board (component side).

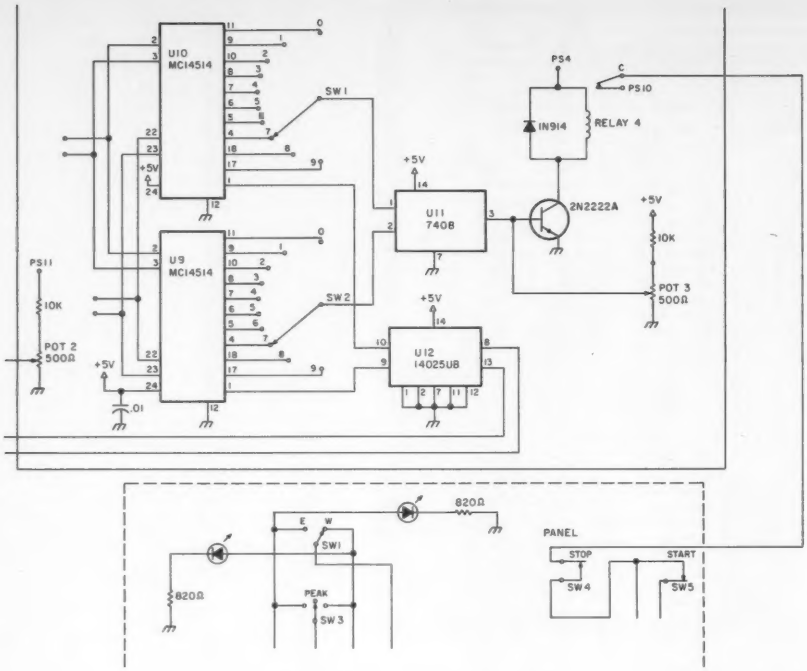


Fig. 9. Control panel schematic.

to a new socket, so I broke it in by using one side of a 14-pin IC, working it around a couple of times.

The boards are mounted in the cabinet by using a couple of long 6-32 bolts and nuts; after the bolts have been made secure, they should be bent parallel with the front and back cabinet. With nuts on the bolts, it is possible to secure the boards so they do not push against the switches but will allow the cabinet to close (Photo A).

A 13-wire cable can be used to connect the control unit that is located at the receiver location to the power supply that is located at the dish. The board has the relays to start, reverse, and stop the motor.

The power supply (Fig. 10) should be installed in a weatherproof box large enough to permit a female chassis connector to be installed in the bottom side. I used an 18-wire cable and 18-prong Jones connector in case more wires are needed at a later date (Photo B). The female chassis connector in the power-supply box is paralleled with the cable so that the control unit can be taken to the dish if necessary. The ac power for the power supply can come from the TVRO receiver if one wants the unit to go on and off with the receiver; otherwise, it can be fed from the dish location.

The construction of the power supply is straightforward except that the 7805 is

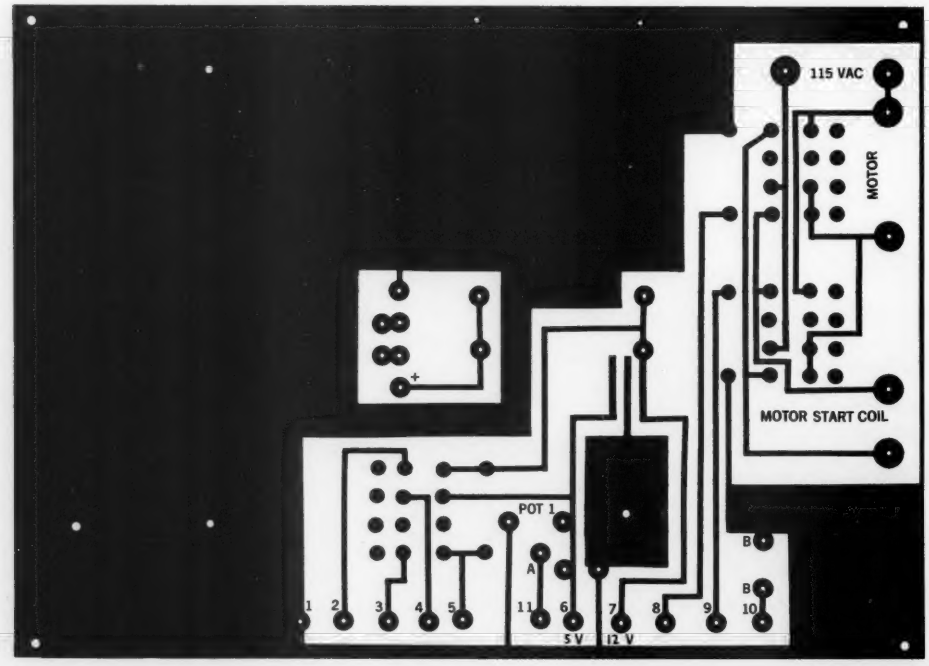


Fig. 10. Power supply PC board (foil side).

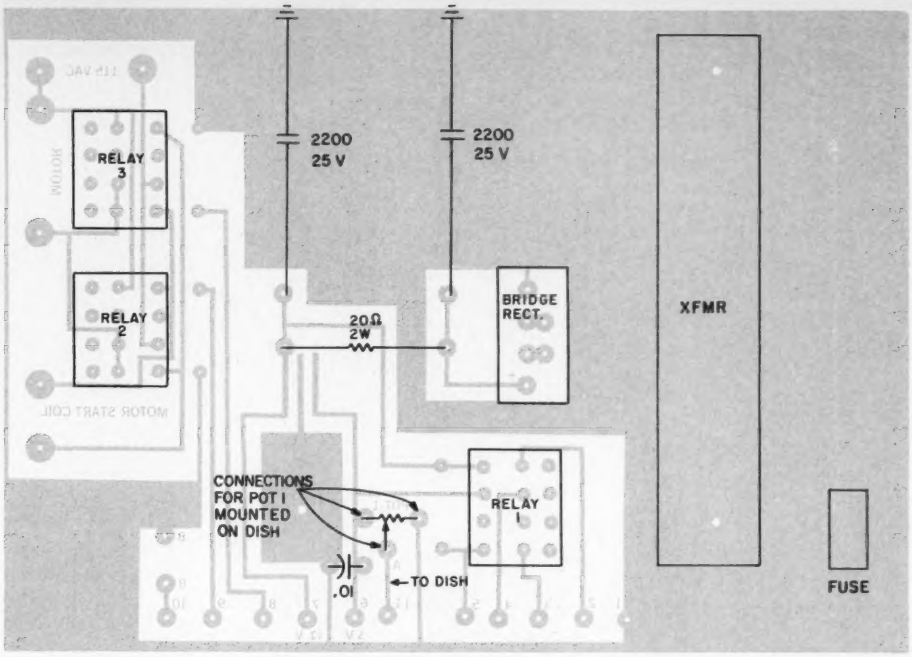


Fig. 11. Power supply PC board (component side).

mounted on the trace side. You should make sure that the 7805 supplies at least 5 V. If it does not, the relays will not operate correctly. If a heavy-duty motor is used, the 3-Amp relays may not be heavy enough, so heavier relays might have to be substituted on a separate mounting. If a permanent-magnet-type motor is used, it would be connected in place of the starting coil. A #54 drill is used for the relays, and a #55 for the bridge rectifier and the 2-Watt resistor.

Knowing that all equipment is subject to failure, I used two mechanical switches (one for the east, one for the west) that will open if the dish turns too far. These switches are connected in the ground return of the holding relay and are connected at BB on the power-supply board. If the switches are not used, B and B should be connected with jumper wires. I also have two other mechanical switches in the ac line which open in case the other switches fail.

Pot 1 at the dish is installed so that it turns with the dish, and it will not be turned off completely on F1 (135° West). The safety switches, if used, should be set so that they will open before the pot reaches its limit of turning. If the reading is backwards, the 5 V and ground leads should be reversed.

The A/D converter is lined up by setting R1 so that the output of R1 is 1 volt. Pot 2 on the control board is adjusted so that when the dish is on the most westerly direction (F1) the reading will be around 5. This will give the most easterly direction (F4—83°) a reading of approximately 60. Pot 3 is adjusted so that each time the 2N2222A receives a pulse, Relay 4 will open. In this adjustment, remember that there will be no power to R4 until the holding relay is closed.

Should you desire to mark the panel (Photo C), dry transfer letters are excellent. Such letters can be removed easily with Scotch tape. After labeling, spray on a thin coat of Krylon™. The Krylon and letters soon wear off, so they should be protected with a sheet of clear mylar™. (Sheet mylar with adhesive on one side can be purchased from office supply houses.) The mylar wants to peel, so with an X-acto® knife trim about 1/8" off around the edges of the panel.

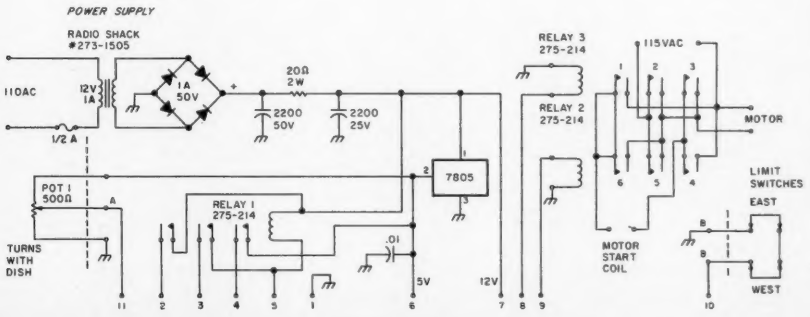


Fig. 12. Power supply schematic.

Operation

To operate the unit, it is necessary to put the two dial switches on the readout number of the chosen satellite, flip the east-west switch in the direction the dish must turn, press the start button, and wait for the dish

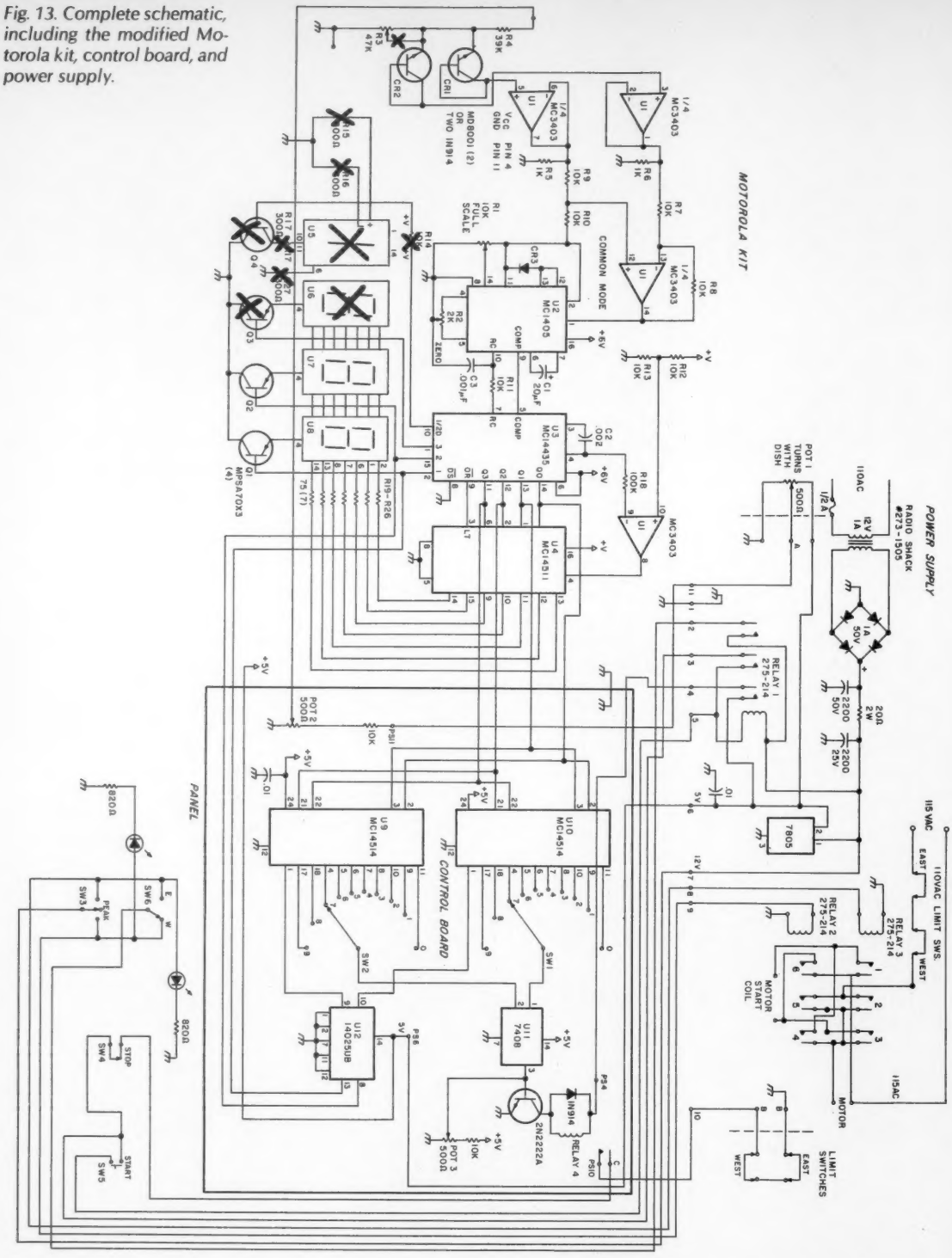


Fig. 13. Complete schematic, including the modified Motorola kit, control board, and power supply.

to move to the new satellite and stop. On weak transponders, it might be necessary to peak the dish. This is done with the peak switch, SW3. Since there are no holding contacts, the dish will stop as soon as the switch is released.

It would have been possible to eliminate the east-west switch and use push-button switches instead of the mechanical switches, but after using this method for quite some time, I decided that the extra circuitry, memories, etc., were not worth the details involved. If one wants to connect it to

a computer, this can be done simply by using only a 4-PDT switch in the BCD lines to get the BCD information from the computer.

Since most ham antenna rotators feed back a small varying voltage for the meter reading, it may be possible to control a ham antenna by adding another readout for 360°.

After putting this unit into operation, you will be pleased with the convenience it offers of scanning the satellites with hardly any effort, and you will be looking forward to the next project. ■

Motorola Kit Parts List

U1	MC3403
U2	MC1405
U3	MC14435VP
U4	MC14511
U7, 8	Common-cathode 7-segment display (MAN 74) .3"
Q1, 2	MPSA70
Q4	MPSA20
CR1, 2	1N914 (or dual transistor MD8001)
CR3	1N914
R1	10k ten-turn cermet
R2	2k ten-turn cermet
R3	47k
R4	39k
R5, 6	1k
R7, 8, 9, 10	10k
R11, 12, 13	10k
R18	100k
R19 thru R26	75Ω
C1	20 μF, tantalum + to pin 7
C2	.002 μF
C3	.001 μF
C4, 5	.1 μF
C6	25 μF at 15 volts

Note: All resistors ±5%, ¼-Watt. All capacitors ±10%.

Control Board Parts List

- 1 5-V-dc SPST relay (Radio Shack #275-216)
- 2 MC14514 ($2.95)*
- 1 7408 ($.31)*
- 1 MC14025 ub ($.40)*
- 2 24-pin socket
- 3 14-pin socket
- 2 .01 50-V capacitor
- 1 IN914
- 2 10k, ¼-W resistor
- 1 2N2222A
- 2 500-Ohm vertical mount pot

* Available from Circuit Specialists, Box 3047, Scottsdale AZ 85257

Power Supply Parts List

- 3 12-V, 4-PDT relays (Radio Shack #275-214)
- 1 12-V, 1.2 Amp transformer (Radio Shack #273-1505)
- 1 3 AG clip in fuse holder
- 1 .5-Amp fuse
- 1 1-Amp, 50-V bridge rectifier
- 1 2-Watt, 20-Ohm resistor
- 1 2200-uF, 50-V elect. capacitor
- 1 2200-uF, 25-V elect. capacitor
- 1 .01 25-V capacitor
- 1 7805—5-V voltage regulator
- 1 Box (see text)

Mounted on Dish

- 1 500-Ohm, ½-Watt linear potentiometer

Cabinet Parts List

- 1 Radio Shack #270-265 cabinet, 7⅞" × 5⅞" × 1¾"
- 2 14-pin sockets
- 2 1-12-position switches (Radio Shack #275-183)
- 1 SPDT small toggle switch
- 1 SPDT momentary spring-return-to-center-off (or Radio Shack #275-637)
- 1 momentary-push-button switch SPST NO
- 1 momentary-push-button switch SPST NC
- 2 820-Ohm, ½-Watt resistors
- 2 LED with holders
- 1 14-pin double DIP jumpers with 12" wire

Take your favorite H.T. out for a drive tonight.

VISA or MASTERCARD for same day shipment.

For $69.95 you get the most efficient, dependable, fully guaranteed 35W 2 meter amp kit for your handy talkie money can buy.

Now you can save your batteries by operating your H.T. on low power and still get out like a mobile rig. The model 335A produces 35 watts out with an input of 3 watts, and 15 watts out with only 1 watt in. Compatible with IC-2AT, TR-2400, Yaesu, Wilson & Tempo! Other 2 meter models are available with outputs of 25W and 75W, in addition to a 100W amplifier kit for 430MHZ. ↩382

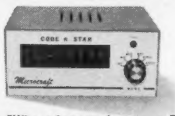
Communication Concepts Inc. 2648 N. Aragon Ave., Dayton, OH 45420 (513) 296-1411

Limited Sale--SAVE $100 Until April 1, 1983
VIDEOSCAN 1000 - HIGH RESOLUTION SSTV

Once you see our picture, you won't settle for anything less!

New generation amateur-standard scan converter sends and receives sharp pictures with up to 16 times better resolution than earlier units. Three scan rates, optional call sign and much more. Easy to use. Amateur, phone line TV, surveillance, teleconferencing, etc. Free "How To Get Started In SSTV".
DEDUCT $100 FROM PRICES BELOW –
Kit: VS-K $595.00 Wired: VS-F $795.00 Shipping: $8.00

CODE★STAR - PRICE BREAKTHROUGH!
More Features Per Dollar Than Anything Else!



Ideal for novices, SWLs and seasoned amateurs. Built-in code-practice oscillator and speaker. Copies Morse, RTTY and ASCII. Large LEDs. Easy to connect and operate. Automatic speed tracking. Excellent digital/analog filtering. 12VDC or 120VAC with AC adapter provided. Compact. 2lbs. Connect computer (like VIC-20)/printer with optional ASCII output port.
Kit: CS-K $149.95 Wired: CS-F $199.95 Shipping: $5.00
ASCII Port Kit: CS-IK $49.95 Wired: CS-IF $69.95

MORSE-A-KEYER -- CW Keyboard Kit: MAK-K $159.95 Wired: MAK-F $199.95 Shipping: $5.00

Wisconsin residents add 5% Wisconsin State Sales Tax to all items.
Call or write for FREE brochures, Factory Direct -- **WE'RE AS NEAR AS YOUR PHONE!**

↩50 *Microcraft* Corporation P. O. Box 513G, Telephone: (414) 241-8144 Thiensville, Wisconsin 53092

HOT ROD ANTENNA

Achieve 1 or 2 db gain over ANY ¾ wave two meter telescopic antenna. The AEA model HR-1 Hot Rod™ antenna was designed by Dr. D.K. Reynolds (designer of the IsoPole) to deliver maximum performance for any hand-held transceiver with a BNC fitting.

The factory-tuned HR-1 is 20% shorter, lighter and places far less stress on your hand-held connector and case. It will easily handle over 25 watts of power, making it an excellent emergency base or mobile antenna. In the collapsed position, the Hot Rod antenna will perform like a helical quarter wave.

The Hot Rod antennas can be expected to make the same improvement to hand-held communications that the IsoPole brand antennas have made to base station operations. Why pay more when the best costs less?

Prices and Specifications subject to change without notice or obligation.

ADVANCED ELECTRONIC APPLICATIONS, INC. ↩2
P.O. Box C-2160,
Lynnwood, WA 98036
(206) 775-7373
Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

↩See List of Advertisers on page 114

Kenneth C. Haas K2YKE
243 Crosby Blvd.
Buffalo NY 14226

The Ultimate Protection Plan for Your HT

Bangs, bumps, scrapes, and crashes make life tough for HTs. Make these modifications to protect your investment.

Please don't drop it! How many times have you said this to yourself and others that have examined your handie-talkie (HT)? Well, with the addition of a simple elastic band and clip assembly, your concern is minimized. This idea can be used on any of the popular models such as the Kenwood TR-2500, the Icom IC-2A, a Yaesu model, or any hand-held with provisions by the manufacturer for a belt-clip attachment.

Since there are many times when one does not wish to use a belt-clip or when convenience dictates that one could not be used, the addition of this elastic band (shown in Photo A) may be the answer. The use of a strap may not be new to some of the older hams, as the hand-helds of World War II vintage used a piece of leather behind the hand for support. However, I believe my technique of attachment is worthy of consideration.

I wanted to be able to fully utilize the unit under all conditions, walking, running, driving, etc., and not have to worry about it falling. Yes, the optional wrist strap was tried, but it did not provide the desired security.

I did not wish to alter the case of my new Kenwood TR-2500, and the need to remove the battery pack prompted the development of this project (see Photo B).

Construction

Simple hand tools such as pliers, metal-cutting snips, a

Photos by Gregg A. Haas

Photo A. Rear view of HT, showing attachment of elastic band to metal clip at base.

Photo B. The felt-lined metal clip is easily removed for battery pack changing or charging.

Photo C. Detail of attachment of band to top rear of unit using the belt-clip mounting nuts already in the unit.

metal file, a hammer, and a screwdriver will enable the average ham with very little knowledge of metal-working to complete this in a couple of hours.

A piece of aluminum or steel (18-22 gauge) 3½" × 3¾" is used for the clip and two ½"-wide by 1⅞" strips are used like washers over the black elastic. The piece of 2"-wide elastic 6½" long was obtained in a local fabric store along with the thin black felt at least 3½" × 3¾". The elastic sells for about $1.25 a yard, so you can see that the 6½" piece cost less than 25¢; the felt 12-inch squares cost 39¢. The only other items necessary to obtain were 2 soft aluminum, flat-head ⅛"-diameter × ¼"-long rivets.

For strength, each end of the elastic was doubled over a distance of ½" and cemented in place with contact cement. Next I cut a ½" × 3¼" strip of metal; this in turn was cut in half, leaving 2 pieces ½" × 1⅞". The transceiver was set upright upon the remaining metal, centering same on all sides. With a thin felt marker pen, the rig was outlined on the metal. In essence, the base of the HT is used as a pattern for the clip (see Fig. 1).

After cutting along the solid line and before bending into shape, the metal was used as a pattern for the felt liner. When bending has been completed, the eight corners are then slightly rounded with a metal file. The elastic band is attached with the folded side toward the clip and the ½" metal strip on the outside using two soft aluminum rivets with the flat head on the inside. Cementing the felt in place with contact cement completes the assembly. The metal parts were painted with a flat black that appears to blend with any HT finish.

I used the 2 extra screws that came in the accessory package with the TR-2500 to attach the top portion of the band. When attaching the band on the Icom IC-2A, you may use the belt-hook attaching screws. (Caution: Do not use any screws longer than ¼".)

I have had this installation on my HT for some time and, even with gloves on, the slight pressure of the elastic increased the sense of "feel" in using the unit. Lastly, the face of the clip makes an ideal spot for inserting one's call letters (Photo C) without concern for defacing the transceiver.

While I am happy to share this idea and simple construction with readers for their own use, a patent is pending on the design described in this article and commercial application is prohibited. ■

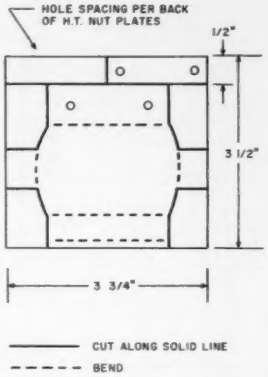


Fig. 1. Metal-cutting pattern.

NOT JUST ANOTHER REGULATED POWER SUPPLY!

The FASTRAK® model 2001 voltage regulator module is ideal for making reliable power supplies in a jiffy. Use it to power your mobile rig, other FASTRAK® series modules or as a general purpose bench supply.

- Component selection sets output voltage (3.3 to 400 V dc) and current capability (5 mA to 100 A). Over voltage protection and remote shutdown included. Uses no ic's.
- One evening assembly using 2 × 3.6 inch pc board and comprehensive instructions supplied.
- Price: $10.80

See you at the DAYTON HAMVENTION!

Price includes: glass-epoxy, etched, plated, drilled pc board; instruction manual; postage in U.S.A. (Ohio residents add 5% sales tax).

Send $1.00 for illustrated FASTRAK® product catalog and refund coupon.

PROHAM ELECTRONICS INCORPORATED
34620 LAKELAND BLVD EASTLAKE OH 44094
(216) 951-2110

SOCIAL EVENTS

Listings in this column are provided free of charge on a space-available basis. The following information should be included in every announcement: sponsor, event, date, time, place, city, state, admission charge (if any), features, talk-in frequencies, and the name of whom to contact for further information. Announcements must be received at 73 Magazine by the first of the month, two months prior to the month in which the event takes place. Mail to Editorial Offices, 73 Magazine, Pine Street, Peterborough NH 03458.

GRAND JUNCTION CO
APR 2

The Grand Mesa Repeater Society will hold the fourth annual Western Slope Swapfest on Saturday, April 2, 1983, from 10:00 am to 4:00 pm, at the Plumbers and Steamfitters Union Hall, 2384 Highways 6 and 50, Grand Junction CO. Admission is free and swap tables are $5.00 each. Features will include an auction and refreshments. Talk-in on 146.22/.82. For further information, send an SASE to Bill Brown KØUK, 582 So. Maple Street, Fruita CO 81521, or call (303)-858-9661.

ROCHESTER MN
APR 9

The Rochester Amateur Radio Club and the Rochester Repeater Society will sponsor the 6th annual Rochester Area Hamfest on Saturday, April 9, 1983, beginning at 8:30 am, at the John Adams Junior High School, 1525 NW 31 Street, Rochester MN. There will be refreshments, plenty of free parking, and a large, indoor flea market for radio and electronic items. Talk-in on 146.22/.82. For further information, contact RARC, c/o WBØYEE, 2253 Nordic Ct. NW, Rochester MN 55901.

FLEMINGTON NJ
APR 9

The annual Flemington NJ hamfest will be held on Saturday, April 9, 1983, from 8:00 am to 4:00 pm, at the Hunterdon Central High School Field House. Flemington NJ, a tourist area, is located between NYC and Philadelphia at the intersection of routes 202 and 31, just 10 miles south of I-78. Admission is a $3.00 donation. There will be a gigantic flea market with 20,000 square feet of heated indoor area, 200 tables, major manufacturers, and more. Talk-in on 146.52, 147.375, 147.015, 224.12, and 224.54. For reservations or more information, call (201)-788-4080, or write Cherryville Repeater Association, c/o W2FCW, Box 76, Farview Drive, Annandale NJ 08801.

SOMERSWORTH NH
APR 9

The Great Bay Radio Association will hold its 3rd annual hamfest-flea market on Saturday, April 9, 1983, from 9:00 am to 3:00 pm, at the Somersworth Armory, Somersworth NH. The entrance fee is $1.00 per person. Food, refreshments, and free parking will be available. For advance registrations and further information, write Great Bay Radio Association, PO Box 911, Dover NH 03820.

KANSAS CITY MO
APR 9-10

The PHD Amateur Radio Association will sponsor the 1983 Missouri State ARRL Convention on April 9-10, 1983, from 9:00 am to 6:00 pm (both days), at the Trade Mart Building, at Kansas City MO's old airport. Registration is $4.00. Swap tables for both days are $10.00, which includes one registration with each table. The Saturday night banquet at the world-famous Gold Buffet is $19.00. Other features will be a complete program of forums, including DX by the Kansas City DX Club, ARRL by Dave Summers K1ZZ, ARRL General Manager, and 11-meter-to-10-meter conversions by Bob Heil K9EID. There will also be an old-timers luncheon sponsored by the QCA, a YL luncheon, the Missouri-Kansas Amateur of the Year Award, and the Missouri-Kansas CW Contest Award. Unlimited free parking will be available as well as free space for RVs (no hookups). Talk-in on 146.34/.94. For more information and registrations, write PHD Amateur Radio Association, Inc., PO Box 11, Liberty MO 64068-0011, or phone (816)-781-7313. All pre-registrations will be held at the door.

BEDFORD PA
APR 10

The Horseshoe RC, the Blue Knob Repeater Association, the Bedford County RC, the Mountain ARC, and the Somerset ARC will hold the first annual Southern Alleghany Hamfest on April 10, 1983, from 8:00 am to 4:00 pm, at the Bedford Fairgrounds, located at the intersection of Rt. 30 and the Rt. 220 bypass, Bedford PA. Admission is $3.00 per person and inside tables are $5.00. There will be computer demonstrations, food, dealers, displays, an ARRL booth, and plenty of parking. Tailgating space is $2.00 per unit and dealers will be able to set up displays the day before. Large, heated buildings will be available in case of foul weather. Talk-in on 145.49 and 146.52. For more information, contact Tom Gutshall W3BZN at (814)-942-7334.

DIXON IL
APR 10

The 17th annual Rock River ARC Hamfest will be held on Sunday, April 10, 1983, at the Lee County 4-H Center, one mile east of junction of Rtes. 52 and 30. A ticket donation is $2.00 in advance and $2.50 at the gate. Tables (6-foot) will be available for $5.00. Doors will open at 6:30 am for dealers and 7:30 am for the general public. Breakfast and dinner will be served. Talk-in on .37/.97. For more information and advance tickets, write to Ed Webb WD9CJB, 618 Orchard Street, Dixon IL 61021, or phone (815)-284-3811.

MADISON WI
APR 10

The Madison Area Repeater Association, Inc. (MARA), will hold its eleventh annual Madison Swapfest on Sunday, April 10, 1983, at the Dane County Exposition Center Forum Building, Madison WI. Doors will open at 8:00 am for commercial exhibitors and flea-market sellers, and at 9:00 am for the general public. Admission is $2.50 per person in advance and $3.00 at the door. Children twelve and under will be admitted free. Flea-market tables are $4.00 each in advance and $5.00 at the door. Features will include commercial exhibitors, a flea market, an all-you-can-eat pancake breakfast, and a barbecue lunch. Plenty of parking space and nearby hotel accommodations are available. Talk-in on 146.16/.76 (WR9ABT). For reservations (early ones are advised) or more information, write to MARA, PO Box 3403, Madison WI 53704.

FRAMINGHAM MA
APR 10

The Framingham Amateur Radio Association, Inc., will hold its 8th annual spring flea market on Sunday, April 10, 1983, at the Framingham Civic League Building, 214 Concord Street (Route 126), downtown Framingham MA. Admission is $2.00 and doors will be open at 10:00 am. Tables are $10.00 (pre-registration required) and sellers may set up beginning at 8:30 am. Radio equipment, computer gear, and food will be available. Talk-in on .75/.15 and .52. For more information, contact Ron Egalka K1YHM, 3 Driscoll Drive, Framingham MA 01701.

SOUTH SIOUX CITY NE
APR 15-17

The 39 Hundred Club will hold the 1983 Midwest ARRL Convention on Friday, Saturday, and Sunday, April 15-17, 1983, at the Marina Inn, South Sioux City NE, directly across the river from Sioux City. On Saturday, features will include a QCWA breakfast, a 3900 Club luncheon, an all-day ladies' program, and an evening banquet with entertainment. There will be seminars, displays, commercial exhibits, and a 66-table flea market, all indoors in the same building. Tables (8 ft. × 30 in.) are $5.00 for the 3 days, $4.00 for Friday night and Saturday. For table reservations, contact Al Smith WØPEX, 3529 Douglas Street, Sioux City IA 51104. Exhibitors should contact Jim Boise KAØGZY, 22 LaSalle Street, Sioux City IA 51104. Setup time is Friday afternoon, April 15th. Convention fees are $6.00 for the 3 days; advance banquet reservations are $10.00 (at the door, $12.00). For advance banquet tickets and motel reservations, write to Jerry Smith WØDUN, Akron IA 51001. For general information, contact Dick Pitner WØFZO, General Chairman, 2931 Pierce Street, Sioux City IA 51104.

WELLESLEY HILLS MA
APR 16

The Wellesley Amateur Radio Society will hold its annual auction on Saturday, April 16, 1983, at the First Congregational Church of Wellesley Hills, 207 Washington Street, Wellesley Hills MA (located at the intersection of Routes 9 and 16). Doors will open at 9:00 am and the auction will start at 10:00 am. Talk-in on .04/.64, .63/.03, and .52. For further information, contact Kevin P. Kelly WA1YHV, 7 Lawnwood Place, Charlestown MA 02129.

LEAGUE CITY TX
APR 16

The Tidelands Amateur Radio Society (TARS) will hold their 1983 Spring-Fest on Saturday, April 16, 1983, at the fairgrounds in League City TX. There will be free admission and plenty of parking. Breakfast will be served at 7:00 am and activities will begin at 9:00 am. Activities will include a flea market, a swapfest, an auction, dealers' displays, demonstrations, and lunch served between 11:00 am and 1:00 pm. For additional information, contact TARS, PO Box 73, Texas City TX 77590.

OAK RIDGE TN
APR 16

The Oak Ridge ARC will hold the fifth annual Oak Ridge Hamfest on April 16, 1983, from 8:00 am to 5:00 pm, at the Civic Center, Oak Ridge TN. Admission is $2.00 and accompanied children will be admitted free. There will be a large indoor dealer display, an electronics flea market, forums, concessions, and computers. Talk-in on 146.28/.88, 147.72/.12 (backup), and 146.52. For more information, send an SASE to ORARC Hamfest, PO Box 291, Oak Ridge TN 37830.

BRAINTREE MA
APR 17

The South Shore Amateur Radio Club of Braintree MA will hold an indoor flea market on Sunday, April 17, 1983, rain or shine, from 11:00 am to 4:00 pm, at the Viking Club, 410 Quincy Avenue, Braintree MA. The entrance fee is $1.00. Tables (8-foot) are $10.00 each, which includes one free admission. Vendors will be admitted at 10:00 am and there will be plenty of free parking. For advance table reservations, send a check payable to the South Shore Amateur Radio Club to Ed Doherty W1MPT, 236 Wildwood Avenue, Braintree MA 02184. A confirmation of check receipt will be sent and there will be no cancellation refund after April 14. For more information, call Ed at (617)-843-4431, evenings.

RALEIGH NC
APR 17

The Raleigh Amateur Radio Society will hold its 11th annual hamfest on Sunday, April 17, 1983, beginning at 8:00 am, at the Crabtree Valley Mall on US 70 west. Admission is $4.00, with no extra charge for tailgating in the covered flea market. Tables will be available for rental. Features will include a CW contest, a home-brew contest, and special-interest meetings. Talk-in on .04/.64 and .28/.88. For additional information, contact RARS Hamfest, PO Box 17124, Raleigh NC 27619.

LINEAR
2 TO 400 MHZ
PLANBOOK
15 to 1000 WATT
14 Different Models, 100 pgs
$11.95
A.P. Systems
Box 263 sm.
Newport, RI 02840 (401) 846-5627
169

DAYTON OH
APRIL

The Washington University Amateur Radio Club will hold a reunion dinner at the Dayton Hamfest. All past members of the club are invited. For more information, contact Washington University ARC WØQEV, Box 1128, St. Louis MO 63130.

BEMIDJI MN
APR 23

The Bemidji Amateur Radio Club will hold its hamfest on April 23, 1983, at the Holiday Inn Convention Center, Highway 2 west, Bemidji MN. Swap tables will be available at the door. Talk-in on 146.13/.73. For more information, send an SASE to Jerry Pottratz WBØMSH, Rt. 8, Box 585, Bemidji MN 56601.

DAYTON OH
APR 29

The 14th annual B*A*S*H will be held on Friday night, April 29, 1983, at the Dayton Hamvention at the Convention Center, Main and Fifth Streets, Dayton OH. Admission is free and parking is available. For further information, contact the Miami Valley FM Association, PO Box 263, Dayton OH 45401.

DAYTON OH
APR 29–MAY 1

The first International VHF/UHF Conference will be held from April 29–May 1, 1983, as part of the Dayton Hamvention, Dayton OH. There will be technical talks and forums with recognized experts, noise-figure and antenna-gain measuring contests, and a hospitality suite get-together with refreshments. For further information, or to advise us of participation in the noise-figure and antenna contests, please contact Jim Stitt WA8ONQ, 311 N. Marshall Road, Middletown OH 45042, or phone (513)-475-4444 (business) or (513)-863-0820 (home).

DAYTON OH
APR 30–MAY 1

The Dayton Amateur Radio Association, Inc., will sponsor the Dayton Hamvention on April 30-May 1, 1983, at the Hara Arena and Exhibition Center, Dayton OH. Admission is $7.00 in advance and $9.00 at the door (valid for all 3 days). Flea-market space is $15.00 in advance and $16.00 at the door. Other features will include forums, new products, exhibits, women's activities, awards, and special group meetings. For special motel rates and reservations, write to Hamvention Housing, 1406 Third National Building, Dayton OH 45402 (no reservations will be accepted by telephone). For other information, write Box 44, Dayton OH 45401, or phone (513)-849-1720. Make checks payable to Dayton Hamvention, Box 2205, Dayton OH 45401.

GREENVILLE SC
APR 30–MAY 1

The Blue Ridge Amateur Radio Society will hold the Greenville Hamfest on Saturday and Sunday, April 30–May 1, 1983, at the American Legion Fairgrounds, White Horse Road, ½ mile north of I-85, Greenville SC. Admission will be $3.00. For advance sales, write Mrs. Sue Chism, Rt. 6, 203 Lanewood Drive, Greenville SC 29607. Talk-in on 146.01/.61 and 223.46/224.06. For further information, write Phil Mullins WD4KTG, Hamfest Chairman, PO Box 99, Simpsonville SC 29681.

NEW! *EASY, FUN KIT!*

New 2 kW tuner kit from TEN-TEC ends constant retuning, guarantees best match, and saves $80! Model 4229 Only $199

Here's the best antenna tuner in amateur radio!

The best quality components, best design, and the best value.

• Reversible "L" circuit guarantees best possible match and widest bandwidth—you may need to tune only once to cover the higher bands and only two or three times on lower bands. • Finest quality parts—ceramic insulators—ceramic inductor form—heavy duty ceramic switch with silver contacts—silver plated roller inductor— • Built-in SWR bridge shows ratios from 1:1 to 5:1 • Built-in 2 kW dual-range watt meter shows power levels from 10 to 2000 watts • Handles 2 kW PEP, 1 kW CW • Frequency range 1.8—30 MHz continuous coverage • Built-in balun—matches variety of antennas, balanced or unbalanced, to 50 ohm unbalanced outputs • Built-in bypass switch • 4-position antenna selector • Coax connectors plus post terminals • Lighted linear dial scale for easy tuning • Black finished aluminum cabinet with stainless steel bail (5½"h x12¾"w x13¼"d) • Also available assembled as Model 229 in slightly different styling at $279.

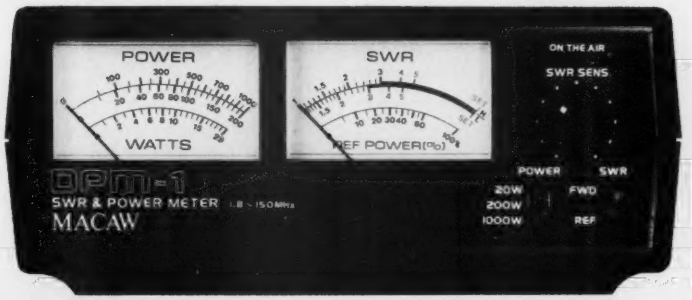
See your TEN-TEC dealer or write for details:
TEN-TEC, Inc., Highway 411 East, Sevierville, TN 37862.

TEN-TEC

SWR and POWER METER

DPM-1

MACAW's DPM-1 SWR/Power Meter has a frequency range of 1.8 to 150 MHz and a power range of 0-20, 200 and 1000W in three ranges. The DPM-1 is compact, lightweight and measures SWR and power simultaneously, only $44.95. Freight Prepaid Anywhere In U.S. Order by telephone or mail:



MACAW ELECTRONICS INC.
5355 Avenida Encinas • Dept. B
Carlsbad, CA 92008 • (619) 438-2326

236

See List of Advertisers on page 114

FILTER CASCADING

The most cost-effective way to improve the selectivity of any receiver – old or new – is to improve its IF filtering. A Fox-Tango Cascading Kit puts a high-quality steep-sided 8-pole filter in series with your present filter(s), both SSB and CW. The result is narrower Bandwidth and better Shape Factor, both of which dramatically reduce adjacent channel QRM – a necessity in today's crowded bands.

CONSIDER THESE KIT FEATURES

- Easy installation - 30 minute average.
- No drilling, switching, alignment.
- 16 poles of filtering yield:
  Filter Shape Factor as high as 1.19.
  Ultimate Rejection better than 100dB.
  Works wonders on SSB; improves CW.
- Compensates for Filter insertion loss.
- Complete instructions, clear diagrams.
- No RX audio impairment, TX unaffected.
- Includes Filter and all needed parts.
- Fits all models of Series - any letter.
- All Filters 8-pole – Guaranteed One Year.

SPECIFY KIT WANTED WHEN ORDERING

YAESU FT101 $75; FT101ZD $70; FT107 $75; FT901/2 $65; FR101 $55 (filter only). KENWOOD T5520/R599 $70; TS820 $70; TS830/RB20 $150 (Two Filters). HEATH SB104A $60.

Shipping $3 (Air $5). FL Sales Tax 5%

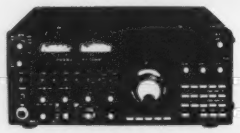
In addition to the above, FOX-TANGO stocks a wide line of $55 SSB, CW, and AM 8-pole filters for Yaesu, Kenwood, Drake R4C and 7-line, and Heathkit. Also, special filters made to order. Send specs for quote.

GO FOX-TANGO – TO BE *SURE!*
Order by Mail or Telephone.
AUTHORIZED EUROPEAN AGENTS
Scandinavia: MICROTEC (Norway)
Other: INGOIMPEX (West Germany)

FOX TANGO CORPORATION
Box 15944S, W. Palm Beach, FL 33406
Phone: (305) 683-9587 ↙323

YAESU

FT-ONE

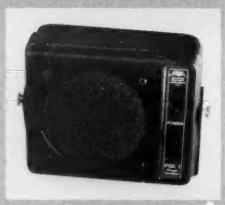


- Three selectivity positions for CW (two for FSK!) using optional filters
- 73 mHz first IF
- 0.3 uV sensitivity
- full break in
- Curtis 8044 keyer available as option
- front panel keyboard
- ten VFO's
- one year factory warranty

Madison Price - $2300.00
with RAM, FM, 4 Filters

MADISON
Electronics Supply
TOLL FREE - ORDERS ONLY
1-800-231-3057
(713) 658-0268
1508 McKinney
Houston, Texas 77010 ↙45

ENJOY COMFORTABLE LISTENING



PSK-1 POWER SPEAKER

Now you can enjoy plenty of transceiver audio without having to turn your hand-held volume control up so far it goes into distortion. The PSK-1 features a powerful 2½ watt (output) 20 db audio amplifier that will interface with virtually any communication receiver speaker output jack. Experience the luxury of distortion-free room filling audio from your hand-held transceiver even in a noisy mobile environment.

The PSK-1 is housed in an attractive case that would also decorate any base station. Power can be obtained from any 12 VDC source capable of 500 mA.

Prices and Specifications subject to change without notice or obligation.

ADVANCED ELECTRONIC APPLICATIONS, INC.
P.O. Box C-2160,
Lynnwood, WA 98036
(206) 775-7373 ↙40
Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

DIGITAL DISPLAY

30 DAY FREE TRIAL
YAESU
HEATH
DRAKE
COLLINS
KENWOOD

DIGITAL FREQUENCY DISPLAYS, WORK ON REC., OFFSET & TRANSM.. 3/8" RED LED'S READ DOWN TO 10 Hz. 1 3/8" HIGH X 4 1/2" W.. NO RADIO MOD'S -- PLUG INTO EXISTING JACKS ON THE RADIOS!!

FT101 SERIES,FT301,FT7,TS520S,TS820,100MXA,HF200A - $110.00
75S,KWM2,32S, FTDX100,401,560,570, SB100-102 & 300-303. ALL HAVE A POWER CUBE AND OFF SWITCH.----- $130.00

DOZENS OF OTHER MODELS AVAILABLE -- WRITE FOR MORE DETAILS.

30M KITS & MORE

ALL WARC BANDS PLUS MOST OF THE GENERAL COVERAGE BANDS WITH YOUR FT101 SERIES, TS520 SERIES & 75S LINE!!! UNBELIEVEABLE YOU SAY --- WELL, WRITE FOR INFORMATION & PRICES ON OUR NEW LINE OF GENERAL COVERAGE SYNTHESIZERS. YOU'L BE SURPRISED!!

NEW 30 METER BAND!! -- GRANDKIT FT101 SERIES KITS GIVE 10-PHZ OPERATION ON THE EXISTING WWV/JJY POSITION. ALL INFORMATION, WIRE AND PARTS REQUIRED. POSTPAID.- $15.00

GRANDKITS FOR MANY OF THE RADIOS WE MAKE DISPLAYS FOR:WRITE.

HANDIE OWNERS !!

HANDHELD PORTABLE RADIOS ---TOP QUALITY COWHIDE "QUICKDRAW" BELT HOLSTER. YOUR RADIO SNUG AND SECURE ON YOUR HIP-READY FOR IMMEDIATE WITHDRAWL AND USE. YOU WILL BE DELIGHTED!! SPECIFY MAKE & MODEL RADIO, BLACK/BROWN LEATHER. --- $30.00

ALSO AVAILABLE -- FINALLY!!! A CAR DOOR OR DASH BRACKET!!!! HOLDS YOUR HANDHELD RADIO. YOU'L LOVE IT. NO MORE FUMBLING ON THE DASH OR SEAT. NO TOOLS. SPECIFY MODEL. ------ $20.00

SUPERCHARGER REVITALIZES YOUR DEAD HANDHELD IMMEDIATELY!!! PLUG IT IN AND FINISH THAT QSO. FULL CHARGE IN SIX HOURS. WON'T OVERCHARGE. SIMILAR TO QST ARTICLE OF DECEMBER LAST. COMES WITH A/C AND D/C POWER CORDS. READY TO GO. --- $70.00

300 MHz DIVIDE BY TEN PRESCALERS, ASSEMBLED AND TESTED ON A CIRCUIT BOARD, JUST NEED FIVE VOLTS TO OPERATE. ADD TEN DOLLARS FOR A PREAMP. WRITE FOR MORE INFO.------ $25.00

IC2A/AT/E SERVICE MANUALS 8x12 WITH LARGER DIAGRAMS. $12.00

ALL ITEMS POSTPAID. CANADIANS ADD 20% AND ORDER FROM B.C!! 30 DAY MONEY BACK ON DISPLAYS, SYNTHESIZERS, CHARGERS AND PRESCALERS, YOU PAY RETURN POSTAGE. CASHIERS CHECK OR M.O.

GRAND SYSTEMS
P.O. BOX 3377 BLAINE WASH. 98230
P.O. BOX 3254 LANGLEY BC CAN V3A4R6
↙132 (604) 530-4551

SEMICONDUCTORS:				P.C. BOARDS FOR MOTOROLA BULLETINS	
MRF-208 - 12.00	MHW-252	- 50.00	EB-18A - 12.00	AN-762	- 14.00
MRF-240 - 15.50	MHW-710-1	- 61.00	EB-27A - 14.00	AN-791	- 10.00
MRF-247 - 34.80	MPSH-81	- .50	EB-63 - 14.00	EB-67	- 14.00
MRF-309 - 27.60	MV2205	- .58	KEMET CHIP CAPACITORS:56 pf, 82 pf,		
MRF-422 - 41.40	78L08CP	- .50	100 pf, 390 pf, 470 pf;-.50 ea		
MRF-454 - 20.00	2N4401	- .75	680 pf, 1000 pf;-.55 ea		
MRF-901 - 1.75	2N5190	- 1.50	5600 pf, 6800 pf, .1 µf;-1.00 ea		
SBL-1 Double-Balance Mixer - 6.50			.33 µf;-1.90 ea .68 µf;-3.90 ea		

CAMBION RF CHOKES: .15 µh, .22 µh, .33 µh, 4.7 µh, 10 µh - 1.20 ea
BROADBAND TRANSFORMERS PER MOTOROLA BULLETINS:AN-762, EB-27A, EB-63
UNDERWOOD/SEMCO METAL-CLAD MICA CAPACITORS:5pf,10pf,15pf,25pf,30pf, 40pf,56pf,60pf,68pf,80pf,91pf,100pf,200pf,250pf,390pf,470pf,1000pf
We also carry a line of VHF, UHF amplifiers and ATV equipment.
Call or write for our free catalog.

Communication Concepts Inc.
2648 North Aragon Ave•Dayton, Ohio 45420•(513) 296-1411 ↙14

MICROWAVE TELEVISION

*Complete Receiver Package
*One Year Warranty
*Surge Voltage Protected
*Temp. Stabilized L.O.
*Choice of Two R.F. Amps.

Model RP. . . .$135 (15 miles)
Model RP + . .$150 (25 miles)

INTEGRATED ELECTRONICS INC.
Box 204 Carlisle, MA 01741 ↙165

Send check or call order to: 617-369-0536 Dealer Discounts.
Write for info on our TVRO Satellite Products.

SATELLITES

YOU'RE THE EXPERT!

If you are active in amateur satellite communications, it's time for you to share your knowledge with other hams by writing articles for *73*. We are looking for material on a wide variety of satellite topics.

Your fellow amateurs will be particularly interested in learning how to use the Phase IIIB satellite, now scheduled for launching on April 27. Topics in need of articles include antennas (especially for the 1269-MHz uplink), 1269-MHz transmitting systems, and power amplifiers, computer tracking techniques, orbital calculations, operating procedures, transverters and how to use them, interpretation of Phase III telemetry, and tips for getting on Phase III inexpensively.

The arrival of Phase III promises a big increase in satellite activity, but only if you do your part in bringing newcomers up to speed. It's easy to write for *73*, and we'll pay you for your efforts. Help make satellite communications a vital and growing part of our hobby. Send today for the *73* author's guide, or send your double-spaced, typewritten manuscripts to *73: Amateur Radio's Technical Journal*, Pine St., Peterborough NH 03458.

SATELLITE QSLS

The AMSAT QSL Bureau is now operated by WB8OTH at the following address: 1850 Lisle Avenue, Obetz OH 43207. If you're on the satellites, be sure to send Perry half a dozen SASEs so that he can forward cards to you. Hundreds of cards currently are awaiting envelopes.

RS-1 AND RS-2 AGAIN

These two Soviet amateur satellites appear to be coming back to life after a long silence. If their communications transponders become operational, *73* will begin publishing orbital data on these two birds.

Amateur Satellite Reference Orbits

Date		OSCAR 8 UTC	OSCAR 8 EQX	RS-5 UTC	RS-5 EQX	RS-6 UTC	RS-6 EQX	RS-7 UTC	RS-7 EQX	RS-8 UTC	RS-8 EQX	Date
Apr	1	0059	96	0037	174	0046	181	0033	175	0025	170	1
	2	0104	97	0032	174	0031	178	0024	174	0022	171	2
	3	0108	99	0027	175	0015	176	0014	173	0020	172	3
	4	0112	100	0021	175	0000	174	0004	172	0017	173	4
	5	0117	101	0016	175	0143	201	0154	201	0014	174	5
	6	0121	102	0011	175	0128	199	0144	201	0011	174	6
	7	0125	103	0005	175	0112	197	0134	200	0008	175	7
	8	0130	104	0000	176	0057	194	0125	199	0005	176	8
	9	0134	105	0154	206	0042	192	0115	198	0003	177	9
	10	0139	106	0149	206	0026	190	0105	197	0000	178	10
	11	0000	82	0143	206	0011	187	0056	196	0157	209	11
	12	0004	83	0138	206	0154	215	0046	195	0154	209	12
	13	0008	84	0133	207	0139	212	0036	194	0151	210	13
	14	0013	85	0127	207	0123	210	0027	193	0148	211	14
	15	0017	86	0122	207	0108	208	0017	192	0145	212	15
	16	0022	87	0117	207	0053	205	0007	192	0142	213	16
	17	0026	88	0111	207	0037	203	0157	221	0140	213	17
	18	0030	90	0106	207	0022	201	0147	220	0137	214	18
	19	0035	91	0101	208	0006	198	0138	219	0134	215	19
	20	0039	92	0055	208	0150	226	0128	218	0131	216	20
	21	0043	93	0050	208	0134	224	0118	217	0128	217	21
	22	0048	94	0045	208	0119	221	0109	216	0125	218	22
	23	0052	95	0039	208	0103	219	0059	215	0123	218	23
	24	0057	96	0034	209	0048	217	0049	214	0120	219	24
	25	0101	97	0029	209	0033	214	0040	213	0117	220	25
	26	0105	99	0023	209	0017	212	0030	213	0114	221	26
	27	0110	100	0018	209	0002	210	0020	212	0111	222	27
	28	0114	101	0013	209	0145	237	0011	211	0108	222	28
	29	0118	102	0007	210	0130	235	0001	210	0106	223	29
	30	0123	103	0002	210	0114	232	0151	239	0103	224	30
May	1	0127	104	0156	240	0059	230	0141	238	0100	225	1
	2	0131	105	0151	240	0043	228	0131	237	0057	226	2
	3	0136	106	0146	240	0028	225	0122	236	0054	227	3
	4	0140	108	0140	241	0013	223	0112	235	0051	227	4
	5	0001	83	0135	241	0156	251	0102	235	0049	228	5
	6	0006	84	0129	241	0141	248	0053	234	0046	229	6
	7	0010	85	0124	241	0125	246	0043	233	0043	230	7
	8	0015	86	0119	241	0110	244	0033	232	0040	231	8
	9	0019	87	0113	241	0054	241	0024	231	0037	231	9
	10	0023	89	0108	242	0039	239	0014	230	0034	232	10
	11	0028	90	0103	242	0024	237	0004	229	0032	233	11
	12	0032	91	0057	242	0008	234	0154	258	0029	234	12
	13	0036	92	0052	242	0151	262	0144	257	0026	235	13
	14	0041	93	0047	242	0136	259	0135	256	0023	235	14
	15	0045	94	0041	243	0121	257	0125	256	0020	236	15

LETTERS

WE NEED R & D

I am an electrical engineer who has kept up with the state of the art. I know from experience that what you say about a lack of qualified engineers is not true. The lack of research and development is the problem. It doesn't do any good to train more engineers if we don't have work for them to do.

I have always been an inventor and innovator. I started by writing computer programs to design crystal filters, then worked on other systems to design TCXOs (temperature-controlled crystal oscillators—AJ). When the layoff came, I got it because R & D is the first to be cut. My design programs made me unnecessary. I then went to work for a consulting firm. We developed a crystal measurement system. We quit consulting and went into manufacturing. I had a dispute over being forced into a management position and quit. The next company got bought out by Dale and they dropped my position in engineering. This time I tried management and failed. I am a very talented R & D engineer, but I get very bored pushing papers around.

I am 41 years old, have an MSEE, have several inventions, and have 4 years graduate studies past MSEE. Motorola GED rejected me because I had too many years experience and had not moved into management yet.

I now work for a small company named Southwest Microwave. I can design anything my boss can think of. We are leaders in intrusion sensors. Two of the engineers I work with are inventors. They started Omni-Spectra by inventing the OSM microwave connector. I hope this company doesn't decide to drop R & D. I now go on sales trips and do R & D and production engineering, but my skills are sharper in R & D.

We need more than just more skilled engineers. We need R & D and management which respects and rewards engineering.

James R. Fitzsimons W7ANF
Tempe AZ

With the recently passed Rudman bill . . . which we'll have more about soon . . . there should be a lot more money for R & D. I'm sure, James, that you're familiar with the tax situation which killed most R & D. And yes, killing off R & D is as stupid a way of saving money when things get tight as cutting back on advertising, but we still see firms doing it regularly . . . shortly before going under as this response escalates the problems. But if you have been reading any of the news magazines, you also know as well as I that the need for technical people is so desperate that our colleges have virtually been cleaned out of science and electronics teachers.—Wayne.

TOUCHDOWN!

If eliminating the code from the ham exams is such a great idea, I have an equally brilliant one. Why shouldn't the National Football League shorten the length of a football field from 100 to 25 yards? In that way they could eliminate spring training (which the players dislike very much) and thus enable the ball carrier to run from one goal line to another without much effort. In a like manner, baseball diamonds, basketball courts, hockey rinks, etc., could be reduced in size. Of course, it would ruin the games, but it would make it much easier on the players, and that is the object of the exercise, isn't it?

H. B. Savage, Jr. K4MD
Coconut Creek FL

Hey, Doc . . . beautiful example of an irrelevant, emotional, non-solution to our problems, mainly a dying hobby which is desperately needed to do what it is supposed to do: set up to provide emergency communications for our country, provide a source of trained people in case of war, invent and pioneer new techniques and modes of communications . . . and foster goodwill. You know, all of those good things mentioned in 97.1, but which old-time rag-chewers seem to conveniently forget as they get further out of touch with technology and fight to keep newcomers out of the hobby.—Wayne.

BASH ADS

I have enjoyed reading *73* and I honestly believe that *73* has the best articles on building of any of the amateur publications on the market. The columns are written by hams and even though I don't have the opportunity to build all that much, I usually read and enjoy the material very much . . . It is fun just to read it.

I read most of your editorials and must admit that you certainly put forth a great deal of effort to make for interesting reading. I guess you could say that you call the shots just like you see them. This makes one not put the book down until the reading is finished.

There is one thing I'm curious about, though. In many of your editorials, you have lashed out at the publications that publish and solicit the Bash material; there have been times where you have stated that perhaps ham radio retailers should chuck the Bash books, etc. Wayne, I am not writing this letter to promote Bash material or to criticize you for the stand that you take; however, there are *73* magazines in the past 2 years where Bash Study Guides are listed and other Bash material is advertised. I guess my question is: Are you aware of this? By the tone of your comments, I presume that you are not! I would like to get an answer that will maybe clear things up in my mind. Thank you and keep up the good work.

Larry Benham KR9M
Mt. Carmel IL

Larry, we've tried to keep the Bash cheat books out of our magazine ads, but they do creep in here and there despite good intentions. However, after seeing that not one ham in the country really gives a damn . . . I'm obviously being an idiot in trying to stage a one-man movement and should go ahead like 100% of the hams and encourage outright cheating to pass the test. Why in hell should I pass up getting a hunk of the fortune Bash is making selling ham radio down the river? If no one else gives a damn, okay, I don't either.—Wayne.

TEST INADEQUATE

I am writing this out of guilt; I just rejoined the ARRL and feel I must do something to atone for it. You have a much better magazine than *QST* and have your head in the 1980s if not the early '90s, unlike those League fuddy-duddies who are still back in the 1920s, at least in terms of outlook. However, I do expect to get a lot of use out of their QSL bureaus now that I have a real moonraker up, and *QST* does a better job of covering the regulatory scene than you. Beef up your efforts in that area, Wayne, and *73* would make *QST* look like so much QRM.

Anyway, what I really wanted to talk about is the no-code license proposal. First some background so you will know where I am coming from: I'm 52, got my first license as a Tech in May, 1979, and upgraded to Advanced in September of that year. I had followed the hobby at a considerable distance since I was a kid in high school, but

1979 was the first time that the sum of my desire plus financial ability added up to enough to go for it. I have a degree in chemistry and almost enough units in math for a major (not bragging, just backgrounding).

My first reaction to a no-code license was "Hell with 'em; let 'em sweat to learn code the way I did!" That's even though I am primarily a phone operator. Then I thought about the day I went to San Francisco for the Advanced test. I'd been warned it was heavy, very technical, and strong on SSTV. Baloney! The most technical question was where they showed a parallel-resonant LC circuit, gave the values of coil and capacitor, and asked for the frequency. That one did take awhile, but only because this fool left his calculator on the breakfast table 50 miles away and had a bit of trouble with the square root of something-or-other times 10 to the minus 15. The only SSTV question had to do with permissible frequencies, a matter which any literate person can memorize.

I have come to feel that a no-code license would be OK on at least some bands *provided* the applicant had to pass a written test that showed some knowledge of electronics beyond Ohm's Law and two-component circuits. As it stands, I have a piece of paper from the FCC that supposedly puts me in about the upper quartile of American hams, knowledge-wise, but I feel miserably inadequate when it comes to such practical matters as what to do when the rig won't work. When I think of people like my friend, Bill K5UX, who not only knows all the theory but knows when, where, and how hard to hit the damn thing with a hammer, I feel like an absolute idiot.

The no-code test should be heavy on practical things such as troubleshooting techniques and should also go into at least the basics of digital logic circuits, because that is increasingly where it's going to be. Further, the FCC should prepare enough different tests that the cheat-sheet peddlers could not frustrate the exam's intent. (In this connection, the League is worse than Dick Bash. At least Bash is honest enough to admit that he is out to cheat the system and get licenses for technical nincompoops.)

I have some other radical ideas about amateur licensing but will save them for another time, because I have run on enough for now. Again, you have the best mag in the business, so keep up the good work.

Fritz Samuels N6BLG
Vallejo CA

NEED CHEAP GEAR

Having just been able to make my first trip to the nearest ham radio store (Seattle WA) in several years, I was able to pick up a copy of *73*. I haven't read any *73*s in many years since I live out in the boonies. I also sent in for a subscription since I liked the magazine so much.

I have been a ham since 1967 and started working 2 meters when it was neat to own a Gonset 2m AM rig; what was FM? I then graduated to an old Motorola 80D and thought that was really neat. Having been away from radio for some time, I have just started thinking about buying some new gear and am appalled at some of the prices I am finding for new gear.

Working as a dispatcher at a local police department and having a family, I find that I can't afford most of the gear that I see advertised at the stores and in magazines. I realize that ham radio has never had it so good, but it really does seem that it is becoming a rich man's hobby. Who can afford a KWM380, Icom 720A, or any of the other new gear on the market? Not I! I remember that I first started with a $50 station and really had a lot of fun. I didn't work all that DX stuff, but I had fun trying.

The reason I am writing is to ask if any manufacturer or radio store makes or carries a good supply of inexpensive radio gear for us poor peons. I really like all the new gear that is on the market, but with the high price, it may as well be on the moon. I remember the old tube rigs that used to be around, but I don't seem to be able to find any of this equipment in decent condition at any of the local ham stores.

How about someone asking the big radio makers of the world to build some good equipment at an affordable price. I don't care if the radio has 10 vfo's, no-tune finals, and digital readout, but it would be nice if it didn't cost an arm and a leg.

I know that there are many articles on building equipment, but I don't have the time or knowledge to do so. There are only 4 hams in this area (none active) and parts are next to impossible to find locally. Maybe you or some of your readers have some suggestions on how the newcomer or us poor folk can get back on the air. If there are no new radios to be had, I would like to find someone who has a good stock of used equipment for sale.

I am also looking for a Tempo VHF One-Plus if any reader has one in good condition he wants to sell. I know it's a little big and doesn't have the features of the new rigs, but it is a lot easier to operate as far as I am concerned. I am interested in RTTY, FM, and satellite operation and would like to hear from those having the same problems. I am also interested in just getting back on the air and upgrading my license. I have been a Tech since 1968 and it is about time I did something!

Raymon A. Quinn WA7KGE
Forks WA

SPEAKER AVAILABLE

Your mention in the December, 1982, issue concerning noted individuals as hamfest speakers seems a very logical and clever idea. Kicking off a plan like that may be difficult, however. I would like to offer my services/abilities to interested groups. I have eight published books and over 250 published articles (all amateur-radio-related); I've presented programs in many areas of the US on topics ranging from slow scan and satellites to DXing, new gear trends, 10 FM, and QRP. . . plus holographic video and future communications concepts. If a hamfest/convention would like my thoughts, I would be honored to oblige.

Dave Ingram K4TWJ
Birmingham AL

AUNTIE BEEB

We greatly appreciated Roger Peterson's piece on Auntie Beeb in the January issue. We used to listen to World Service news when we lived in Berlin; also, we were happy to find out where Margaret Howard was these days. She attended Indiana University in Bloomington IN in 1969; I was fortunate enough to be in one of the same graduate school journalism courses that she was, and so we became acquainted. WD9HDZ and I last saw Margaret in London in 1975 or so and had since lost touch.

The frequency list is also much appreciated. Thanks again, and a Happy New Year.

Susie Scott N8CGM
Cincinnati OH

GENERAL CLASS ONLY

This letter was prompted by the letters that I read in the January issue of *73*. I have a few comments that I think will rile up hamdom as quickly as your comments.

First, I like the ARRL regardless of what you say and I am assuming that you get your copy of *QST* each and every month, if you will level with us. Second, I think that your opinions on *QST* are fostered by word-of-mouth interpretations of the goings on of the *QST* staff. Don't you wish that you had the income that is "wasted" by *QST*? Anyway, I subscribe to *QST*, *CQ*, and *73* because of the controversy that arises immediately after the publication of one of your tirades. Now, this letter is to create some kind of balance.

I am going on record now, and have before, as advocating a General license class *only*—no Advanced or Extra licensees from now on. Let's have the whole band for *all* amateurs and spread out for more comfort. Let's have no common denominator when we want to QSY. I also think that the different classes of licensees are creating a terrific case of class distinction and some snobbishness on calls that are completely out of line. Get rid of the different classes.

The cost of amateur gear is a constant issue with newcomers. May I say that there are terrific prices on some good used gear on the market? Don't forget, ham gear is not subject to salt and slush; 95% of ham gear is put on the market each year as a ham upgrades to the new gear for the fast electronic improvements that seem to be running away with us. Does anyone remember the $500 and $600 cost of Golden Eagles and Trams and the big Johnsons—5 Watts instead of 100 out?

The last of my comments is about the indiscriminate use of linears. What a band 20 meters would be if all the linears were shut off for 1 week on a trial basis. If linears had a built-in splatter guard and would shut down immediately if overdriven, it would be great and the band would be operable. My contention is that linears beget linears and the only things the guys want to hear are 40 over nine reports, regardless of audio clarity or bandwidth.

I am one of the "older" hams and like to feel that we are the stabilizing factor in good conduct. The younger ones with their so-called new ideas and limited resources are in no position to dictate on hamming until they get enough air time to make it count. The young fellows do very well as long as they use good common sense in their operating practices, and we do need them.

About home brew—outside of small projects, this is fine, but just try to design or even build anything to match what is on the market today, with its phase-locked-loop circuits and terrific engineering. Yes, the fun is in getting it to work, but I'll bet that is as far as it goes.

Jack Golden KK2W
Portville NY

Jack, many hams like the ARRL. After being a member for over 40 years I don't like 'em . . . and I don't dislike 'em . . . any more than I like or dislike a lot of other bureaucrats. And, yes, I do draw conclusions about what is going on at the ARRL from things insiders tell me . . . something wrong with that? Perhaps it is a frugal Yankee background which makes me dislike seeing money wasted . . . and remember that I am an ARRL member and presumably thus have a vested interest in getting the best for my investment. Your one-class idea isn't new or novel, but does have much to recommend it. I've written editorials suggesting just such a licensing arrangement. Hamgear costs? If you put the cost of a new rig into any perspective it has to be one of the best hobby investments in the world. I can buy a darned good allband rig for about the same price as a wind surfer, a good camera, a twentieth the cost of a good sports car, a good typewriter, a computer, less than a good hi-fi, less than a good TV set, and so on. Put things into perspective. Only hams who are not progressing and using their hard earned skills are short of money. The world is anxious to pay almost anything for repairs of electronic equipment, help in setting up security electronics, and many things for which a good ham is eminently qualified, even in his spare time. And now, linears on 20m . . . yes, the band would be a lot quieter without 'em . . . and the hams in Asia wouldn't hear many US stations much of the time. I suspect we would still have plenty of interference, but just a couple of S-units weaker.—Wayne.

LEGALIZE MDS

I have an idea. I don't know if it is new, but it might help overturn some of the recent court rulings against owners of "illegal" MDS receivers.

Install 450-to-2300 ATV repeaters. We have the 2300-2450 band and it can be used for ATV. It also can be tuned very easily by any of the MDS receivers on the market. Besides stirring up activity on this band, it would permit clubs or individuals to "broadcast" CW or training classes or even official bulletins. I think this is just as legal as W1AW and it would give anyone a reason for owning an MDS receiver. After all, you don't have to be licensed to own a shortwave receiver.

Maybe some of the 2-meter FM pioneers that are looking for some new challenges can do this. The technology is simple and I think somebody is already marketing a low-cost 2300-MHz transmitter.

With such a system in place, it ought to be damn easy to get these outrageous rulings overturned. If we don't do something now, cases like these involving our personal freedom are only going to get worse.

Fred Studenberg W4BF
Melbourne FL

BIG-FOOT GRINGO

So, Wayne, you and your wife survived an odyssey through Colombia and the "barracudas" who besieged you at the street corners that serve as terminals for inter-city buses in Barranquilla and Cartagena!

I have been to the same corners looking for the same bus services as you did and fully agree with you regarding the inexcusable conditions at and around those spots. However, I must address and comment on some of the other concepts expressed by you:

1) *Poverty*—Yes, Colombia is poor. However, not all of it is in disrepair. Inexcusable, too, and for that matter even more so, is the heartbreaking squalor in some areas of New York City, Boston, New Orleans, and Appalachia in this, the richest country of the world.

2) *The "Barracudas"*—This type is found almost everywhere, not only in the so-called Third World. At least in Barranquilla and Cartagena those poor people were eagerly trying to make a buck by rendering some service and were friendly. A great number of the poor in the USA try to make a buck by staying on welfare. And, how about the "friendly" muggers, pimps, and prostitutes that teem in New York's Times Square and

in Hollywood, California? They are "barracudas" of a worse kind.

3) *The Buses*—For a USA world traveller of your kind (if it's Tuesday this must be Belgium), loaded with Yankee gold, you chose the cheapest mode of transportation. Didn't it dawn on you to check if a private, air-conditioned limousine was available? It could have been. I travelled by bus, for my interests and values are different from yours, of course.

4) *The Language*—In trying to be smart, your subconscious betrays you and your biases surface all too clear. In the Caribbean area, old man, there are millions of black people. For your education, Spanish, not Swahili, is the language spoken by Colombians of the black race. I wonder if you have travelled within the USA. In case you will ever travel through Washington, DC, Alabama, Louisiana, the Carolinas, Virginia, New York, etc., don't be surprised if the blacks in those areas do not speak Swahili but English.

5) *Amenities*—Ah, there was an ice machine on your floor at the hotel in Cartagena! Had you asked for it, you could also have had ketchup to go with your steak!

Old Man, it seems that the *73* publication has in you an editorialist who travels and sees the world and writes about it with the sensibility of the typical big-foot gringo oblivious of the fact that the USA, for all its might and glory, also has many an eyesore, both physical and of the soul, that can be easily exposed.

And what is even more pathetic, you visited Cartagena, which is, so to speak, a banquet in history and Spanish colonial architecture, and you missed it all, it seems, since you found nothing loftier to comment on than a street corner and an ice machine in your hotel. What an input for your readers; what a shame!

The foregoing may be an overreaction, but I hope that it will at least serve for you to understand and learn that writing about other countries and peoples requires much tact and responsibility. I dare you to give this letter equal time in your columns. Long live *QST*!

Alvaro Guzman WA6WMN
Arleta CA

Alvaro, you seem to have your own problems. I enjoyed Colombia and most of the readers enjoyed reading about my short visit there. I'm sure there is some rationale for publishing your letter, but other than to present a distorted view of what I wrote, I'm not sure what it is.—Wayne.

FUN!

John Edwards KI2U
78-56 86th Street
Glendale NY 11385

THE YEAR THAT WAS—1964

Do you know what the Wireless Operators Memorial is? No, it's not a monument dedicated to those who died while waiting to make a contact off of a DX list. If you're ever in New York, you might want to make a trip to Battery Park to view one of the Big Apple's least-visited tourist attractions. A granite column with bronze plaques listing the names of 48 radio operators who went down with their ships while faithfully sending out distress signals, the monument was installed by a group called the Veteran Wireless Operators Association. If you have trouble finding the memorial, just remember that it's about halfway between a bust of John Wolfe Ambrose, known for his 40-year struggle to fulfill his lifelong dream of dredging New York Harbor, and a statue of John Ericsson, holding what looks like a scrub brush but is actually a scale model of his ironclad Civil War ship, the *Monitor*. Remember, you read about all of this in FUN!

Let's move on to more esoteric items. The other day, I was browsing through the on-line encyclopedia that's available on the Dow Jones News/Retrieval Service. Suddenly, I thought, "Gee, I wonder if they have anything on my favorite ham, Hiram Percy Maxim?" With that, I typed HPM's name into my TRS-80 and got the information that he invented the gun silencer, co-founded the American Radio Relay League, and did pioneering work on the automobile muffler. Nothing new there. What I did find fascinating, however, was Maxim's bibliography. According to DJNS, one of the primary sources of information about old Hiram is a nifty tome titled *Merchants of Death* (1934), edited by Clifton Johnson. Golly. The ARRL co-founded by a "merchant of death"? Something to think about.

Before we get to the puzzles, a few words about this month's topic. With this installment of FUN! we inaugurate a new feature—"The Year That Was." On an irregular basis, we'll be looking at specific years in ham-radio history; years that for one reason or another (usually several reasons) turned out to be pivotal times for our hobby. To kick off the series, we start with a look at 1964. Why 1964? Well, it really was a turning point in ham radio. Phone ops were finally making the big shift from AM to SSB in droves, the great incentive licensing debate was at a peak, and the ARRL was celebrating its 50th anniversary. On a more personal note, 1964 was the year I first came in contact with amateur radio. It happened at the 1964 New York World's Fair. The League had installed a station at one of the pavilions and was inviting the public to get a first-hand look at our hobby. I asked if I could twist the dials on one of the Collins rigs and was told—quite rudely, I remember—no. I later found out that the fellow who denied me access to the radio later became president of the ARRL. Psychologists, take note; I was 8 years old at the time.

ELEMENT 1—CROSSWORD PUZZLE
(Illustration 1)

Across

1) Ham slang for something nice
3) Lyndon. . .
7) Not 1 Down (abbr.)
8) World's radio board (abbr.)
9) Spain prefix
10) Month of ARRL's anniversary
11) Our globe
13) Little of this on 20 meters
14) Plate current
16) A personal listening apparatus
17) A primary goal of our service
19) Western city (abbr.)
20) Line power (abbr.)
21) Top DX frequency (abbr.)
22) Egypt prefix
25) An international organization (abbr.)
26) AC4-land
28) Threadbare
32) Big 1964-65 event (2 words)

Down

1) Ham who ran for president in 1964
2) Make a tape copy
3) Although HQ was built in 1962, ARRL still had this in 1964 (2 words)
4) Bird #3 was built in 1964
5) Where many jammers should be living
6) Site of 32 Across (3 words)
12) African broadcast company (abbr.)
15) The value of. . .
18) Abundance
23) Decibel (abbr.)
24) VHF band where activity was mostly AM in '64
27) Morse question mark
29) Digital gate
30) Radiolocation (abbr.)
31) Direction finding (abbr.)

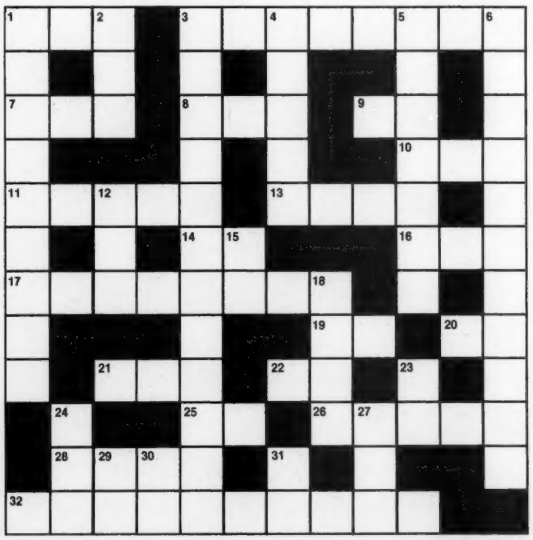


Illustration 1.

ELEMENT 2—MULTIPLE CHOICE

1) As mentioned during the introduction, the ARRL had a ham station at the 1964 New York World's Fair. Pick the company that housed the station in their pavilion.
   1) Pepsi-Cola
   2) 7 Up
   3) Dr. Pepper
   4) Coca-Cola

S	C	Z	X	V	M	T	N	L	K	U	O	Q	X	H
A	W	A	A	A	A	A	A	E	A	A	A	A	Q	A
A	Z	A	A	A	A	A	A	A	L	A	A	A	W	L
A	H	A	N	A	X	A	M	A	A	L	A	A	U	L
A	Q	A	A	A	A	A	A	A	A	A	I	A	S	I
A	K	A	A	C	A	A	A	H	A	A	A	M	F	C
B	W	F	L	G	O	N	S	E	T	H	M	Y	P	R
T	G	U	E	W	B	K	R	N	H	L	T	X	Z	A
I	W	S	A	A	A	A	A	R	A	A	E	A	N	F
K	W	N	A	A	M	A	A	Y	A	A	L	A	X	T
H	I	I	A	A	A	E	A	A	A	A	R	A	D	E
T	M	L	A	A	G	A	C	A	A	A	E	A	T	R
A	T	L	A	A	A	A	A	O	A	A	X	A	L	S
E	R	O	H	E	W	O	Q	W	C	B	N	M	K	A
H	D	C	A	N	A	T	I	O	N	A	L	J	J	E

Illustration 2.

2) The son of which former president of the United States was president of the ARRL in 1964?

1) Woodrow Wilson
2) Herbert Hoover
3) Franklin Roosevelt
4) Warren Harding

3) What city played host to the 1964 ARRL National Convention?

1) Des Moines, Iowa
2) Lincoln, Nebraska
3) Independence, Missouri
4) New York, New York

4) Amateur radio played a vital role (some say it was ham radio's finest hour) during this 1964 earthquake. Pick the disaster's location.

1) California
2) Mexico
3) Chile
4) Alaska

5) During 1964, the FCC began charging amateur radio license fees. How much did it cost back then to take an examination or renew a ticket?

1) $2.00
2) $4.00
3) $10.00
4) $20.00

ELEMENT 3—TRUE-FALSE

	True	False
1) The callsign of the ARRL's fair station was K2WF.	___	___
2) By 1964, more than 6000 hams had responded to the FCC about the incentive licensing proposal.	___	___
3) The first-ever Field Day was held in 1964.	___	___
4) The 1964 "Goldwater Bill" provided for reciprocal operating agreements for amateurs.	___	___
5) It cost $20.00 to request a special callsign in 1964.	___	___
6) The FCC celebrated its 30th anniversary during 1964.	___	___
7) The US Government celebrated the ARRL's 50th anniversary by issuing a commemorative medallion.	___	___
8) In June, 1964, the FCC temporarily outlawed the use of semiautomatic keyers ("bugs").	___	___
9) 1964 was the peak of a solar cycle.	___	___
10) As a feature of its anniversary year, the ARRL sponsored a contest in which selected articles submitted to *QST* were awarded a $25 US Savings Bond.	___	___

ELEMENT 4—HIDDEN WORDS (Illustration 2)

Hidden in this puzzle are the names of ten amateur equipment manufacturers active during the year 1964. The names are formed in any direction—horizontally, vertically, or diagonally, forwards or backwards. As you find each word, circle it.

THE ANSWERS

Element 1:
See Illustration 1A.

Element 2:
1—4 Coke was it.
2—2 Herbert Hoover, Jr. W6ZH.
3—4 New York, New York. The town so nice they named it twice.
4—4 The famous "Good Friday" quake.
5—2 See? Not everything has gone up in price!

Element 3:
1—False K2US.
2—True No apathy then.
3—False Long-time tradition.
4—True Help for the traveling ham.
5—True Let's see. For a 1 × 2 call that was five bucks a character. Not bad.
6—True Didn't you ever hear of the Communications Act of 1934?
7—False A postage stamp.
8—False Come on!
9—False No. But things were looking up.
10—True Look, it's more than they pay now.

Element 4:
See Illustration 2A.

SCORING

Element 1:
Twenty-five points for the completed puzzle or ½ point for each question correctly answered.

Element 2:
Five points for each correct answer.

Element 3:
Two and one-half points for each correct answer.

Element 4:
Twenty-five points for the completed puzzle or two and one-half points for each name found.

Know your nostalgia?

1-20 points—Born in 1965
21-40 points—Amnesia victim
41-60 points—Out of the country during '64
61-80 points—Remembers it well
81-100+ points—Photographic memory

G	U	D		B	J	O	H	N	S	O	N			
O		U		U		S			L		E			
L	I	B		I	T	C		E	A		W			
D				L		A			M	A	Y			
W	O	R	L	D		R	O	O	M		O			
A		S		I	P				E	A	R			
T	R	A	I	N	I	N	G		R		K			
E				G			L	A		A	C			
R		M	U	F		S	U		D		I			
	T			U	N		T	I	B	E	T			
	W	O	R	N		D		M			Y			
W	O	R	L	D	S	F	A	I	R					

Illustration 1A.

S	C	Z	X	V	M	T	N	L	K	U	O	Q	X	H
A	W	A	A	A	A	A	A	E	A	A	A	A	Q	A
A	Z	A	A	A	A	A	A	L	A	A	A	W	L	
A	H	A	N	A	X	A	M	A	A	L	A	A	U	L
A	Q	A	A	A	A	A	A	A	A	A	I	A	S	I
A	K	A	A	C	A	A	A	H	A	A	A	M	F	C
B	W	F	L	G	O	N	S	E	T	H	M	Y	P	R
T	G	U	E	W	B	K	R	N	H	L	T	X	Z	A
I	W	S	A	A	A	A	A	R	A	A	E	A	N	F
K	W	N	A	A	M	A	A	Y	A	A	L	A	X	T
H	I	I	A	A	A	E	A	A	A	A	R	A	D	E
T	M	L	A	A	G	A	C	A	A	A	E	A	T	R
A	T	L	A	A	A	A	A	O	A	A	X	A	L	S
E	R	O	H	E	W	O	Q	W	C	B	N	M	K	A
H	D	C	A	N	A	T	I	O	N	A	L	J	J	E

Illustration 2A.

HAM HELP

Wanted: manuals or schematics for the Hallicrafters SX-99 and S-120 shortwave receivers; the RCA 7-band receiver, model 3-BX-671; the RCA WV97A volt-ohmmeter; the DAK Mark III 40-channel CB; the SCP SC100T-BIL amplifier; and the ECI Port-A-Lab swr meter. I am also looking for used code-practice cassette tapes at 13 wpm or more. I will pay for all postage and copying costs.

John D. Hudson
7045 Skyles Way T-2
Springfield VA 22151

I am looking for the name and address of the manufacturer that makes a radio called "Mr. Thin."

B. S. Pillay
PO Box 936
Port Elizabeth
South Africa

I need manuals and schematics for a Hammarlund SP-600. I will pay for them.

C. E. Darrah WA6JNF
304 N. Alvord St.
Ridgecrest CA 93555

PORTAPEATER™

$179.00 assembled unit

M100 A INSTANT REPEATER ANY BAND ANY MODE

$99.00 assembled board

- *4Channel PROM CW I Der
- *VOX or COR operation
- *250 volt switching capability
- *An Instant Repeater
- *Works with any type radios
- *Complete Timer Functions
- *Built In Test Functions
- *20 Page Technical Manual

(Fully tested, programmed, assembled) ✓302

W-S ENGINEERING P.O. BOX 58, PINE HILL, N.J. 08021

(201-852-0269)

ALL BAND TRAP ANTENNAS!

PRETUNED - COMPLETELY ASSEMBLED - ONLY ONE NEAT SMALL ANTENNA FOR UP TO 7 BANDS! EXCELLENT FOR CONGESTED HOUSING AREAS - APARTMENTS LIGHT - STRONG - ALMOST INVISIBLE!

FOR ALL MAKES & MODELS OF AMATEUR TRANSCEIVERS - TRANSMITTERS - GUARANTEED FOR 2000 WATTS SSB 1000 WATTS CW. INPUT FOR NOVICE AND ALL CLASS AMATEURS! IMPROVED DESIGN!

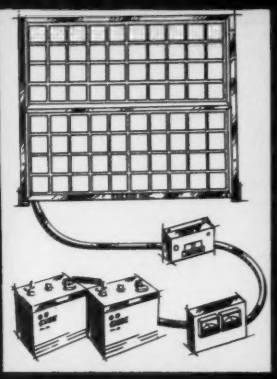
COMPLETE AS SHOWN with 90 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 30 ft. 300 lb. test dacron end supports, center connector with built in lightning arrester and static discharge - molded, sealed, weatherproof, resonant traps 1"X6"- you just switch to band desired for excellent worldwide operation - transmitting and receiving! Low SWR over all bands -Tuners usually NOT NEEDED! Can be used as inverted V's - slopers - in attics, on building tops or narrow lots. The ONLY ANTENNA YOU WILL EVER NEED FOR ALL DESIRED BANDS - WITH ANY TRANSCEIVER - NEW - EXCLUSIVE! NO BALUNS NEEDED!

80-40-20-15-10-6 meter - 2 trap --- 104 ft. with 90 ft. RG58U - connector - Model 998BUC . . . $89.95
40-20-15-10 meter --- 2 trap --- 54 ft. with 90 ft. RG58U - connector - Model 1001BUC $88.95
20-15-10 meter --- 2 trap --- 26ft. with 90 ft. RG58U - connector - Model 1007BUC $87.95

SEND FULL PRICE FOR POSTPAID INSURED. DEL. IN USA. (Canada is $5.00 extra for postage - clerical - customs etc.)or order using VISA - MASTER CARD - AMER. EXPRESS. Give number and ex. date. Ph 1-308-236-5333 9AM - 6PM week days. We ship in 2-3 days. ALL PRICES MAY INCREASE . . SAVE - ORDER NOW! All antennas guaranteed for 1 year. 10 day money back trial if returned in new condition! Made in USA. FREE INFO. AVAILABLE ONLY FROM

WESTERN ELECTRONICS Dept. A7-4 ✓80 Kearney, Nebraska, 68847

ELECTRICITY FROM SUNLIGHT



We Make Photovoltaic Systems, Components, Hardware & Accessories

A REALITY TODAY

Send $3.50 for Catalog to:

ENCON PHOTOVOLTAICS

Distributors of Solarex Photovoltaics

Dept. 73 27584 Schoolcraft

Livonia, MI 48150

(313) 261-4130 ✓172

CALL LETTER

HATS — T SHIRTS ✓187

101 & Elm Street, Suite 4 Peterborough, NH 03458

HATS

Only $6

HAT COLORS

Royal Blue Navy Blue

Red Gold Green

Hats Are One Size Fits All - Nylon Mesh Back

LINE 1 CIRCLE ONE OF THE DESIGNS ABOVE

LINE 2

OR

LINE 3

OR

NOTE* Hats Maximum 8 Large or 16 Small Letters Per Line

LINE 4

OR

T SHIRTS

Only $8

SHIRT SIZES

Adult : Sm Med Large X-Large

Child : 2-4 6-8 10-12 14-16

SHIRT COLORS

Lgt Blue Tan Wht/Blue Trim

Wht/Red Trim

Attractive and Durable, just the thing for field days, contests, conventions or any other activity. Ideal personalized gifts for special occasions and they carry your own personal message. Imprints are permanent and guaranteed not to fade, peel or shrink. Order 12 or more and we will reproduce your own business or club logo FREE. Remember, every item can have a Different name or message in addition to your logo. Imprints are generated by computer for total flexibility and FAST service.

CALL LETTER HATS 101 & Elm Street Suite 4 Peterborough, NH 03458

Name _____ Phone _____

Address _____

City _____ State _____ Zip _____

Ck ☐ Money Order ☐ Charge Card ☐ # _____

Signature To Validate Order _____ Exp. Date _____

ORDER BLANK Add $2 To Total For Shipping Charges

AZDEN.

PCS-2800 10-METER MICROCOMPUTER FM TRANSCEIVER

- Just 6-3/4" x 2-3/8" x 9-3/4"
- Microcomputer controlled
- Detachable head
- 6 channels of memory with scan
- Full band scan
- 10 watts output - also 1 watt low power
- Dynamic microphone, internal speaker, mobile mounting bracket, and hardware included

SPECIAL

$229.00

- 28 - 29.995 MHz, 10 kHz steps with -100 kHz offset

AMATEUR-WHOLESALE ELECTRONICS

8817 S.W. 129th Terrace, Miami, FL 33176

Phone 305-233-3631

Toll Free 800-327-3102

CREDIT CARD HOLDERS MAY USE OUR TOLL FREE ORDERING NUMBER ✓180

✓See List of Advertisers on page 114

REVIEW

LARSEN MOBILE MOUNT

Before I left my parents' home to go into the great wide world, my father took me by his side and offered sage advice from his years of experience.

"Son," he said, "never leave your mobile rig in the car overnight, or it will be stolen."

For years, I have followed his advice faithfully, disconnecting power leads, coax, and auxiliary speaker connections, fighting with jury-rig mounts made from rubber bands and plywood that substituted for a good, permanent installation. Though this nightly ritual quickly grew tiresome, it was not until recently that I discovered a different way that takes no time and little effort—the Larsen Quik-Change mounting system.

The Larsen mount comes in two pieces—one which is mounted in the car, with all of the connections permanently hooked up, and a lower half which is installed on the radio. A second set of permanent connections are made here, and the two halves slide together, completing the circuits and securely holding the radio.

Connections between the two halves are made via 4 pins and a specially-designed coax connector. All of the pin connections create a good electrical contact; I have had no interruptions due to poor contacts, although the unit has been tested over a period of several months, including driving on dirt roads with ruts that would dwarf the Grand Canyon.

Nor has the mount shaken loose. Larsen thoughtfully equipped the Quik-Change system with a plethora of mounting holes on the half which stays in the car. This makes it easy to install the unit across a wide range of automobile makes and models. The top half is composed of an impact-resistant plastic slide topped by a metal plate. Out of the back comes a short length of RG-58/U which ends in a female threaded coax connector; all other connections are made to a terminal located between the top plate and the lower piece. When installing the mount, you must first make all of your connections, close the two pieces, then mount the top half under the dash or in another suitable place. If you pay attention to the routing of your wires and cables, once the top half has been secured, only about 3/4" of black plastic will show beneath the dash.

The bottom half sits on top of your radio like a saddle and is held in place by the standard side mounting holes. The width of the radio may vary from as narrow as the mount itself to about 9" wide. Again, all leads coming from the radio, with the exception of the antenna, are connected to a terminal on the back of the mount. Two leads come from the mount—a piece of coax and a connector which screws onto your radio's SO-239, and a dual-conductor wire which ends in a subminiature phono plug. This plug is for your radio's external speaker jack, and through the top half of the mount, it can be wired into any speaker configuration you desire.

Making the basic connections—power and antenna—do not use up all of the connecting pins, so this system leaves room for expansion if you want to add on any special features.

In use, the Larsen system has proved to be a boon to my mobile operating. When making a trip with frequent, short stops, it takes only seconds to pull the radio from the mount and swing it into the trunk. On my return, I slide the radio back into the mount, and it fastens with a satisfying click. The release mechanism has been designed for easy, one-hand operation so you can pull the radio and carry it without having to change your grip.

However, the advantages of the Larsen system don't stop there. If, like many hams, you own two cars and frequently find yourself driving the one without your rig, two Larsen mounts will solve the problem. With them, you can move your rig from one car to the other with ease. Or, if you have two rigs—for example, a 2-meter FM and a converted 10-meter rig—you can use the Larsen system in conjunction with a coaxial switch to easily change from one mobile rig to another.

The low profile and black plastic make the Larsen mount difficult to see once it is installed, and it will not interfere with passenger comfort in smaller automobiles. It has also been designed to be manufacturer-independent and will work equally well with almost all brands of radios.

Larsen also provides an optional key lock system which will lock the two halves together. That may be satisfactory for short hops, but this mounting system makes it so easy to remove the radio that there is no excuse for allowing your rig to become a sitting duck.

For additional information, contact *Larsen Electronics, Inc., 11611 NE 50th Ave., PO Box 1799, Vancouver WA 98668; (206)-573-2722.* Reader Service number 477.

Avery L. Jenkins WB8JLG
***73* Staff**

RTTY AND MORSE FROM KANTRONICS AND COMMODORE

Computerized RTTY and Morse have been technically possible for a long time. Unfortunately, "technically possible" too often translates into "complex and expensive." Consequently, the number of amateurs enjoying this interesting mode remained, until recently, relatively small. The advent of low-cost microcomputers was bound to change that situation. Enter the Commodore VIC-20, the Kantronics Hamsoft communications software, and The Interface terminal unit (TU), also from Kantronics.

A Three-Part System

In addition to your station transceiver, there are three main components to a computerized amateur communications system: a computer, software which causes the computer to behave as a communications terminal, and interface hardware to connect the computer to the transceiver. Let's examine each item.

The VIC-20 is an extremely popular computer. According to its manufacturer, several hundred thousand VICs are now in the field. For amateur radio use, this computer has two advantages. First, the VIC possesses a full-size keyboard; many other low-cost computers do not. A real keyboard is a must for comfortable typing, and believe me, you'll be doing a lot of typing when you get hooked on RTTY. A second reason for choosing the VIC is the Kantronics hardware and software, which is designed specifically for use with the VIC-20. This feature greatly simplifies the task of getting on the air. The retail price of the VIC is $299.95, but it is often discounted to well under $200.

A computer without software is like a stereo system without records—useless. Kantronics' Hamsoft program enables the VIC-20 to function as a communications terminal for RTTY and Morse transmission and reception. Such a terminal is sometimes called a "glass teletype" with some justification. Together, the computer and software comprise a substitute for a mechanical teleprinter, such as the venerable Model 15. The main disadvantage of the mechanical method is that the speed, mode, and other operating parameters are fixed. Changing speeds, for instance, requires changing parts inside the machine. By contrast, changing speeds in a computer-based system can be as simple as pushing a button. Switching from Baudot to ASCII or Morse is equally simple. Try that on your Model 15! Flexibility—that's the main advantage of going to a computer. This flexibility is illustrated by Table 1, which lists the features of the Hamsoft program.

Incidentally, Hamsoft is supplied, not on cassette tape or floppy disk, but as a small circuit board that plugs into the game cartridge slot of the VIC-20. The program resides in a read-only memory (ROM) on the board—very convenient. Hamsoft for the VIC-20 is priced at $49.50. The program is also available for the Apple II, the TRS-80 Color Computer, and the Atari 400 and 800.

Although Hamsoft may work with many different terminal units, Kantronics warrants it to perform correctly only with The Interface, Kantronics' own TU. The Interface is a small plastic box full of hardware that goes between the terminal (the computer) and your transceiver. It measures just 5" × 2.5" × 5.25". Under control of the Hamsoft program, The Interface keys your rig, converts received audio into TTL levels that the computer can accept, and converts computer-generated TTL levels into audio tones for RTTY transmission or into on-off keying for CW. The rear panel of The Interface is loaded with jacks for connection to the transceiver and computer. The front panel contains the power switch, a RTTY/CW selector, an LED tuning eye, and a 10-segment LED bar-graph tuning aid. The Interface contains active filters for both RTTY and CW. The Interface retails for $189.95

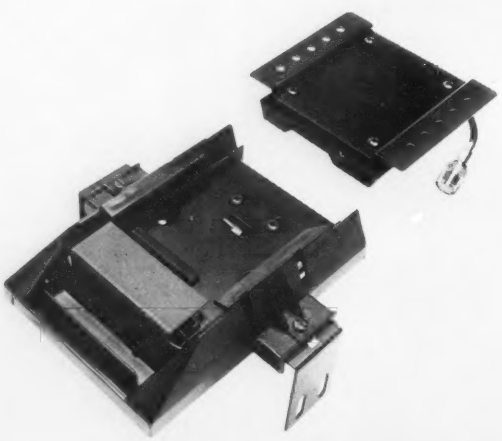
Connections

Putting it all together is mainly a matter of wiring cables to connect your station transceiver to The Interface. Kantronics provides plugs to fit the jacks on the rear of The Interface, but you must supply connectors for your transceiver's mike, CW key, and external speaker jacks. The VIC-20/Hamsoft/Interface hookup requires five cables.

Using the System

With this system, the VIC-20 executes the Hamsoft program as soon as you turn the computer on. When all parts of the system are powered up, a short series of questions appear on the VIC's video display, allowing you to tell Hamsoft what type of terminal unit you are using, select a mode, enter a message into one of 10 buffers, or set the internal clock. If you select RTTY, the system goes directly into the 60-word-per-minute (wpm) Baudot mode. From there, however, you can choose other speeds and modes (ASCII and Morse) with a few simple keystrokes. The system is not quite as easy to use as some others, but once learned, works fine.

At this point, it's time to tune in a signal and see what prints on the video display. The tuning eye and bar graph on The Interface are valuable aids here, but it still requires careful tuning to get good copy. I found the best results when I followed the Kantronics tuning procedure. This involves beginning the tuning with the signal at a low pitch, then slowly increasing the pitch of the signal until the tuning indicators respond and good copy shows on the video display. It works that way most of the time, but there are the inevitable exceptions. Sometimes I tried several speeds before finding the correct one. At other times,



The Larsen Quik-Change mounting system.

Morse Code
- 5–99 words per minute
- automatic speed tracking

RTTY
- Baudot: 60, 67, 75, 100 wpm
- ASCII: 100, 300 baud
- automatic CW ID

General
- split screen display
- 1024-character transmit buffer
- 10 255-character message buffers
- printer compatibility for hard copy

Table 1. Features of the Hamsoft RTTY/CW software.

copy was possible only by switching to the opposite sideband on the transceiver's mode switch. Of course, there were some instances where the filters in The Interface were not selective enough to separate two closely spaced signals.

I was disappointed in the manuals for the Kantronics products; neither was very well organized. In addition, the Hamsoft instructions were much too brief, lacking even one example of how to use the system. Examples are absolutely essential, especially for newcomers.

Conclusions

Buying a computer for RTTY and CW may seem like a big investment. It's important to remember, however, that that same microcomputer is also available for myriad other uses, limited only by your imagination. In addition, some ham dealers offer a low package price when you purchase the computer, software, and interface at the same time.

I have used the system for many successful contacts on both RTTY and CW, including DX CW QSOs and local 300-baud ASCII contacts. In comparison with other computerized CW/RTTY setups I've used (all more expensive than this one), the overall performance of the Commodore/Kantronics combo rates better than average on CW, a bit below average on RTTY. On a price/performance basis, however, the VIC-20, the Hamsoft program, and The Interface are hard to beat.

For more information, contact *Kantronics, 1202 E. 23rd, Lawrence KS 66044; Commodore International, 487 Devon Park Drive, Wayne PA 19087.* Reader Service number 488.

Jeff DeTray WB8BTH
73 Staff

FIST FIGHTER

Think you're a pretty good CW man, eh? How are you with a hand key? Do those B's and V's leave a little to be desired? What about F's and Y's? Well, maybe you are pretty good at that, but I'll bet you that this little gem from the Blacksburg Group can make you better!

The boys at Blacksburg figured that you *can* teach an old dog new tricks, and it's even easier to teach a young dog new tricks, so they came up with a neat idea for creating the kind of fist you've always wished you could have. They designed a circuit that would have a built-in memory for perfectly-formed characters at any speed. They also programmed it so that the proper space between characters would be remembered. Now comes the neat part: Fist Fighter doesn't send code—you do, but it forces you to send it in accordance with the built-in memory. If your fist tries to do its own broken rhythm and jagged little dance on the key, you're in for a big surprise—nothing comes out of the box!

Well, you say, you can get around that easy enough by fooling the circuit, right? Nope, won't work. The only way you're going to fool the circuit is to send CW the way it wants you to send CW, not the way you want to. Dad-blamed thing is frustrating, believe me. First time I tried it, I got mad and left it in frustration and anger. No danged machine is gonna tell *me* how to send code, nossir.

I came back and tried setting it to different speeds... must be some speed I could have my way with it. Wrong again! More anger and frustration. Well, I did get even with the little critter in the end (heh,heh). I plugged it into the power supply with reversed polarity! Served the little demon right!

Well, I sent it back to the Blacksburg boys, and they fixed it... for good. They changed the circuit a bit and made it so that no matter which polarity you use when you connect it to your little 12-volt-dc supply, you won't hurt it.

Round three. At last, I was beginning to get the hang of it. So that's the way a Y oughta sound? Hmmm... lemme see, now a Q. Not bad. That little machine is learning from me after all, says I, soothing my own ego a bit. Might not have to throw it out, after all!

Round four. Showed the little jewel to my buddy, Ken, who is learning to become a ham. He's been working on the code right along. Boy, bet this will fool him! Here, Ken, try this little machine... see if you can make it work. (Boy, this is gonna be fun, thought I... let's watch him sweat like I did.)

What's that—code, nice and easy and regular coming out? Can't be! Well, so as not to bore you any more, I'll make it short. That little Fist Fighter got along just fine with Ken; they *both* had nice fists.

Later, I said to Ken, "How do you figger that, Ol' Buddy? How come you can make that little rascal sit up and beg, while it just sits there and fights me? Heck, I been CWin' for 32 years and you haven't been CWin' for 32 hours yet!"

Well, Ken kinda sat back and smiled and said so quietly I could barely hear him; "Well, Jim, maybe you just have more to unlearn than I do."

Now, I'm not going to say that the Fist Fighter is for everybody, because it isn't! If you've got a short fuse and you hate to learn new tricks, stay away from it, because you're not going to get along. On the other hand, if you are willing to improve yourself or if you're just starting out and want to learn to send some of that machine-perfect code with a hand key, stick with the Fist Fighter. It's a better teacher than most, because you teach yourself. A little patience and discipline is all you need. Feller like myself, of course, goes back to his old ways and his friends say, "There's Ol' Jim... always can recognize that fist of his!"

If you want a little workout and think you're a better fighter than the Fist Fighter, why don't you prove it by sending your $59.95 to the boys in Ol' Virginny? Write *Blacksburg Group, Box 242, Blacksburg VA 24060, (703)-951-9030.* Reader Service number 476.

Jim Gray W1XU
73 Staff

GALFO'S APPLE II AMATEUR RADIO COMMUNICATIONS PACKAGE

Without a doubt, the computer has entered into the amateur radio shack to perform a wide variety of functions. Perhaps one of the most established and growing areas involves RTTY communications. Mr. Galfo has provided the amateur community with a fine software package for RTTY, Morse, and ASCII purposes. The inexpensive software provides a flexible medium for communications and is very simple to operate. The Amateur Radio Communications Package for the Apple II computer is a versatile one indeed. It provides for transmission and reception of Morse, Baudot, or ASCII codes. The speed range is variable with buffering and memory capacity which is quite large.

The Morse portion of the program provides for transmitting rates between 2 and 125 words per minute. The speed which is selected for transmission also selects the optimum receiving speed. The actual speed of reception will adapt to within a 3 to 1 range of the sending speed. The dot to dash radio is set up at 1 to 3 with character and word spacing also included. The RTTY and ASCII portion uses the 5-bit Baudot or 8-bit ASCII codes with a continuous speed range of 32 to 300 baud. The usual control characters are quite easily accessed. Transmit/receive switching is available from the keyboard (ESC) or from the software (control C). Morse characters such as end of message, end of QSO, end of work, go ahead, end of line, wait, and break are included. CW ID followed by a carriage return, line feed, and letter sequences are also available with one command. An interesting feature involves an end of text marker in the transmit buffer. When this signal is encountered in the text, the transmission is terminated, followed by CW ID. One is then ready to receive or continue the same or another memory.

The program's transmit buffer is large. For an 8K Apple, there are 500 bytes available; for a 48K Apple, there are 20.5 kilobytes available for the transmit buffer. With the use of the end of text marker in the transmission buffer, this allows for extended type ahead usage. The stored message texts range from 2 kilobytes in the 8K Apple to 22 kilobytes in the 48K Apple.

The message text can be formatted in a variety of ways but basically consists of using a key word in the text to bring up any one of a variety of messages which can be created and entered into the software program itself.

One example is typing into the buffer "okay, control A TNX control A." The output would be transmitted as "okay, thanks for the call" provided that you had previously entered the key word and message into memory. For those individuals not familiar with programming, it only involves two steps to create a memory such as this:

```
DIM TNX $ (20)
TNX $ = "thanks for the call"
```

There is a 255-character limit in each message memory. In using the key words, one only needs to enter "control A" before and after the key word to identify it as a key word for memory recognition. With 22,000 bits of information available for message storage, one can readily see the flexibility of having a wide variety of subjects covered for use without having to resort to changing programs, whether it be contesting, DXing, or rag-chewing with the usual crowd. The ID key word is specific in that it will send the proper Morse identification prior to the receive mode.

The type of receiver, transmitter, transceiver, terminal unit, frequency shift key circuit, and CW threshold detector are all independent of the program. A simple and reliable schematic is available with the software ("Got an Apple? Want RTTY?", Constantine Papas, *73*, October, 1982). One or two evenings should normally be more than adequate to build and interconnect the Apple II computer with the terminal unit, transmitter, and receiver. A store-bought terminal unit with AFSK only takes a few minutes to plug in.

The program itself is in two parts. A set of machine-language routines handles the real-time task and code conversions, while Basic is used to execute the conversion between user and computer. The software is available from tape or diskette. The diskette programs are always more easily used, but even loading the program from cassette is quick and non-traumatic. After loading the program, the package is set into motion by entering "run" as a basic command. Buffer and memory allocations are automatically set according to the memory space available. The program begins by requesting several types of information, basically whether or not one is to use Morse, Baudot, or ASCII. The word or character mode is determined next. When in the word mode, the transmitter will not transmit the last word until it is complete and a space has been typed. In the character mode, each character is sent and is released from the text buffer one by one. The transmission speed is determined next. The 2- to 125-word-per-minute Morse and 32- to 300-baud RTTY speeds are all available. A fill character is requested, should the transmit buffer empty; one or two non-printable characters or no characters at all may be chosen, in which case a steady mark is maintained when the buffer is empty.

Following the initial setup, the program will go into its receive mode to copy signals present on the input line. The screen is now divided into three separate fields. The top 16 lines are the received text. A single center field is the field showing the character being sent, as well as the next 38 characters to follow. The last five lines on the bottom of the screen show the text that is being placed into the transmit buffer. The fields grow individually as text is added to each. Word wraparound is automatically adjusted for a 40-character line on receive.

When ready to transmit, the escape key will allow you to toggle between transmit and receive. Entry into the transmit buffer may be made during transmit or receive from the keyboard. If the transmitter buffer empties, the characters will stop until you once again enter information to be transmitted. The escape key may be used to return the state to receive or, at the end of a transmission, one may enter a "control C." When the "control C" is encountered, the program will go into its receive mode automatically following a CW ID.

The text you prepare does not require carriage returns or line feeds. They are generated automatically to give a standard 72-character line that does not split short words when operating RTTY. The carriage return, line feed, letter sequence is placed at the beginning of each transmission automatically. CW transmission is a continuous stream, as one would normally find. Character spacing is three dots with word spacing of five dots on transmit.

Another item included in the software is

HAMEG OSCILLOSCOPE

- 20 MHz Dual Trace
- Built-in Component Tester
- X-Y Operation (1:1 Ratio)
- 2 x 20 MHz, Max. 2 mV/cm
- Timebase 40 ns – 0.2 s/cm
- Trigger Bandwidth 30 Mhz

133
Rivendell Assoc.
RFD-5 DERRY, N.H. 03038 WARNER HILL (603) 434-5371

See List of Advertisers on page 114

"control B" which clears the text buffer, clears the entire screen, and returns the system to the receive mode. With the ability to use the forward and backspace cursor movements, modifications can be easily made to the transmit text prior to it being transmitted. Should a speed change be required, a simple "control S" returns the system to the interactive mode for a speed change or other control change.

All interconnections to the Apple computer are made through the game port. The RTTY input signal, RTTY output signal, Morse input signal, transmit/receive control, and Morse output signal are the only five connections other than a common ground required.

There are no provisions for received message storage or the ability to print out the received text. There is also no provision for "WRU" (who are you?). It is quite simple to load the program, answer a few questions, and begin receiving or transmitting. The combination of simultaneous reception with the ability to use the extensive buffer and memory storage space makes for a relaxed communication program, providing an enjoyable means of operating.

For more information, contact *C. H. Galfo WB4JMD, 6252 Camino Verde Drive, San Jose CA 95119.* Reader Service number 486.

E. Benson Scott II AE5V
West Monroe LA

The Rest of Ham Radio
Dan Fox W2IQD

Foundation Publishing
PO Box 805
Merrimack NH 03054
173 pages, $13.95

The generic fad has overtaken amateur radio. We have generic callbooks and logs. Who knows, before the year is out someone may introduce a generic rig. It will come in a white cardboard box and bear the label "Transceiver." With this in mind, I was not surprised to find a generic operating manual in my mailbox. But once you look beyond *The Rest of Ham Radio*'s plain wrapper, you'll be pleasantly surprised by its contents.

Readers familiar with Dan Fox W2IQD's earlier effort, *The Apartment Dweller's Handbook*, can attest to his ability to get to the heart of a subject and present practical solutions to everyday problems. In *The Apartment Dweller's Handbook* it was solving the problem of limited resources, whether it be money, room for antennas, or ways to beat TVI. Now, with the task of assembling a station out of the way, W2IQD focuses quite literally on "the rest of ham radio." Acknowledging that newcomers to ham radio have plenty of literature to get them through their first QSOs and that old-timers probably don't need a new book, *The Rest of Ham Radio* is aimed at the advanced beginner.

Two chapters are devoted to DX, another two cover contest operation, there is a section on awards, a chapter on repeaters, and so on. Pastimes like QRP operation, satellites, RTTY, and SSTV are the final four chapters. Purists may criticize the lack of coverage of such topics as hang-gliding mobile or coherent CW, but the author, wisely remembering that a book cannot be all things to all people, decided to stick to amateur radio's most popular haunts.

Unlike many of amateur radio's traditional tomes, *The Rest of Ham Radio* doesn't rest on an ivory tower view of what the author thinks amateur radio should be. Instead, W2IQD combines his twenty-five years of operating experience with advice from acknowledged experts and a lot of research. The book that results is a lot like a smorgasbord: You might not like everything that is offered, but you're sure to find something that will satisfy your appetite. And if the information on such subjects as satellite operation or SSTV doesn't appeal today, then it might next year.

Perhaps it is nitpicking, but I was just a tad uncomfortable about paying $13.95 for a book that has a homemade appearance. After realizing that everything costs more these days and that you really can't judge a book by its cover or the typewriter-style print and amateurish drawings, I've concluded that we need more books like *The Rest of Ham Radio*. In remembering the experienced beginner or General/Technician class licensee just starting out, W2IQD has given the "forgotten ham" something to cheer about.

The Rest of Ham Radio is distributed by *Birch Hill Sales, PO Box 234, Peterborough NH 03458.* Reader Service number 487.

Timothy Daniel N8RK
Oxford OH

RTTY LOOP

Marc I. Leavey, M.D. WA3AJR
4006 Winlee Road
Randallstown MD 21133

I promised a tip of the hat to Al Jolson last month, so here we go. Though April showers bring May flowers, the columnist's mailman brings letters, and do we have a bunch this month!

Let's start with a topic I don't think we have touched upon ever in this column. Francis Surovec WD9HPA of Fort Wayne, Indiana, writes that he is using a "clean" Teletype® Model 28 in his RTTY station, but would like to quiet it down. He lives on the second floor of a duplex, and despite the open-mindedness of his neighbor, he is still concerned about the amount of noise, particularly the hum of the running motor.

Well, when I lived in an apartment (also on the second floor) with a Model 15, I faced much the same problem. I remember the day that a new family moved in downstairs and the man of the house came upstairs to see us. It seems that he was an old Navy communications man and "could have sworn he heard a Teletype machine," but couldn't believe his ears. When he saw the Model 15 in my bedroom, well, you can imagine his face. The racks of old equipment didn't hurt, either. Nonetheless, I did what I could to soundproof the machine, and here are a few tips.

Go to a well-stocked hardware store and look for a "fatigue mat." These are thick (one to two cm), dense foam mats that are used at counters for people to stand on. Cut one to size and use it *between* the machine and table, if possible. Another mat may be used under the table, between legs and floor. Building an acoustic enclosure of lumber and lining it with ceiling tile also helps to cut down on transmitted kerchunking. You can often get slightly damaged two-by-four-foot ceiling tiles for the asking at building supply houses. They are ideal to line such a cabinet. Finally, experiment with where in the room you put the machine. Random resonance in the floor may magnify the sound quite a bit in one area, attenuate it to almost nothing a few inches away. It's kind of like swr! Try these ideas out and let me know what happens.

Regards to another medical colleague, Dr. G. Bescher F6ADX, from Plerin, France. His letter relates his use of a TRS-80 for both computing and amateur radio and the acquisition of a Dataproduct T-1602 printer. He is in need of technical information for this printer. Anyone with a manual or such can write to him at 64 Rue du Roselier, Plerin, France 22190. I'm sure he would appreciate the help.

Richard Flink WB2SOU in Hillsdale, New Jersey, is another individual looking for frequencies of commercial stations broadcasting with RTTY. We have described several sources for such information here in the past; I just found another! Now this is going to get a bit off the track, but bear with me.

Universal Software Systems, Inc., has put together a RTTY program for the Apple II computer. Called "Super-RATT," this combination of machine language and Basic sends, receives, saves to disk, or sends from disk on an Apple II and almost any demodulator. It is user-modifiable and may be backed up or copied for personal use without problems. RTTY is supported at all common speeds, and CW from five to 100 words per minute. Several unique features include the ability to decode bit-inversion ciphers, such as used in various press signals, a file transfer system for interstation exchange of data, and video or hard-copy output. As if that is not enough, a full Radio Bulletin Board system is built into the software, allowing your computer to become a central focus in a communications system.

As part of the ongoing support for users of Super-RATT, USS is publishing a newsletter, *The RATT's Nest*. In its premier issue, a listing of RTTY press stations logged by users is given. Also included is news of new products and updates, as well as user modifications passed along but not guaranteed by the management. Looks like a nice package, available from Universal Software Systems, Inc., 9 Shield's Land, Ridgefield CT 06877. Be sure to tell them RTTY Loop sent ya! As I said, the story was a bit convoluted, but it all comes out okay in the end, right?

Steve Stout KA5CRI sends along a few circuits that will interest quite a few of you. Fig. 1 shows a low-voltage loop supply that Steve uses to run his Model 15. His terminal unit requires an external loop, as do many of the newer solid-state units, and using this low-voltage, current-limited supply has a side benefit of preserving the terminal unit's output transistor's life.

Fig. 2 is a circuit Steve put together to "expand" the loop to add another pair of selector magnets, which happened to be encased in a reperforator. In the old days, a power supply of 200 volts or so was used to run two or more RTTY machines in series. Stringing them together formed a "loop," thus the name, local loop (and, by extension, RTTY Loop!). But these days, with low-voltage transistorized outputs, putting two or more sets of selector magnets in series loads down the output to the point where the system will not operate; thus, this circuit. The optoisolator basically keys the second loop, and several of these circuits may be chained together to expand the loops *ad nauseum*. Thanks to Steve for passing these ideas along.

For the past several months, this columnist has been looking into a RTTY terminal program for a 6800-type computer. I have been told that such a program would interest maybe six people worldwide. Is that true? I may change my mind and pursue the 6800, but I am beginning to think that that may be a dead system for wide circulation. Mine is far from moribund, but is it a dinosaur at age seven? My current plans are to complete the "block diagram" discussion, which is processor independent, then look into program development for a 6502-based system, very possibly the Atari. As I said last month, the membrane keyboard is "feh," but I hope to acquire an upgraded Atari with a real keyboard and disk which would lend itself to developing such a program on it. The sound generation system in the Atari may also lead to AFSK without much bother; I don't know. Let me know what you think. Is the 6800 dead as far as you all are concerned? Would you rather see an Atari version? What features are important, which others are nice, fluff, or useless? Drop me a card to voice an opinion. It will count.

Next month some more on the above, and more from out there, all from in here, the old-fashioned, high-voltage RTTY Loop.

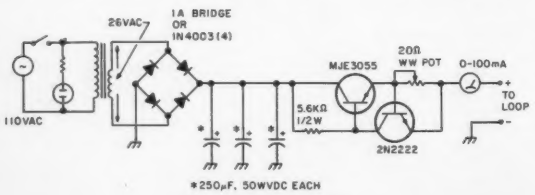


Fig. 1. Low-voltage loop supply.

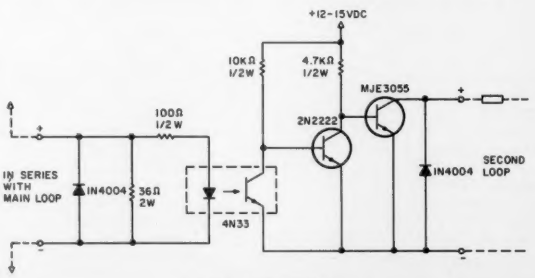


Fig. 2. Loop expander.

AT LAST!

This service will be available nationally. Lab tested & time proven modifications professionally installed in your amateur Handy-Talkie 2M, 220, 440, MH2 transceiver by Henry Radios warranty technicians (KNOWN AS "A&W PRODUCTIONS")

HAVE ALL PL TONES AVAILABLE AT YOUR FINGER TIPS

Outboard the dip switch! Have it neatly inlayed into the back cover of your Handy-Talkie making all 32 PL Tones Selectable at a moment's notice.

$25 Got your own PL? Send it to us with your Handy-Talkie unit and we do the professional installation for you.

$55 We will install a new PL and inlay the dip switch into the back cover of your Handy-Talkie ready to operate.

Send us your Handy-Talkie unit and a check or money order plus $3.50 for shipping and handling payable to **A&W PRODUCTIONS, INC.**

For **TEMPO** units the dip switch is inlayed into the Push-to-Talk bar. The **TEMPO S-15** will have the dip switch inlayed into the back cover.

$45 We will install a **NEW BATTERY BEATER** in your **TEMPO S-1, S-2, S-4, S-5 READY** to operate. Your New Battery Beater will use the same jack as the charger with no new holes and regulation circuits built into unit. Comes with Cigar Lighter Adapter with internal fuse.

CONTACT A&W PRODUCTIONS FOR SPECIAL MODIFICATIONS YOU MAY WANT TO HAVE DONE. WE SPECIALIZE IN THE TEMPO HANDY-TALKIES.

WE ARE AN OFFICIAL "TEMPO" REPAIR STATION

ALL WORK GUARANTEED FOR 30 DAYS. SEND YOUR HANDY-TALKIE AND A CHECK OR MONEY ORDER TO:

AW PRODUCTIONS ↙164

3305 Pico Blvd., Santa Monica
California 90405 (213) 828-9310

Orbit

ORBIT is the Official Journal for the Radio Amateur Satellite Corporation (AMSAT), P.O. Box 27, Washington, DC 20047. Please write for application.

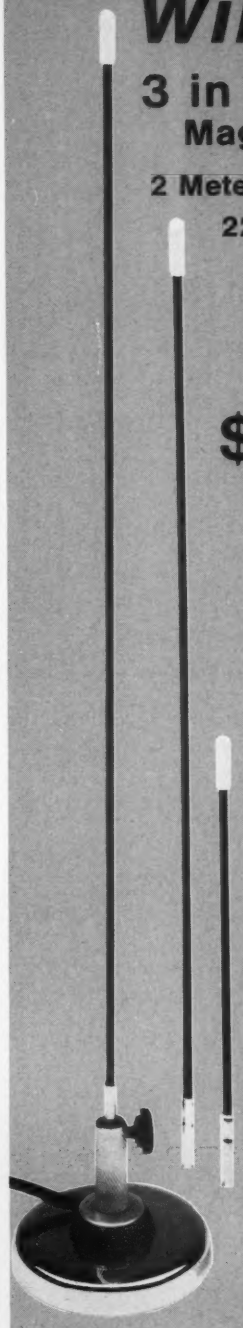
For a **FREE SAMPLE COPY** please send $1 to cover First Class Postage and handling to: Orbit, 221 Long Swamp Road, Wolcott, CT 06716.

Have Rod... Will Travel

3 in one ¼ Wave Mag Mount Antenna

2 Meters
220 MHz
440 MHz

Super Rod 3



$19.99

Complete set with cable assembly

- Fiber Glass Construction
- No Corosion
- Quick Change Rods
- Fits in any Attache Case
- Triple Chrome Mag Base
- *Tuned Antenna* Quality

The Tuned Antenna Co. has done it again with the "Super Rod 3" ¼ wave 2 meter, 220 MHz, 440 MHz magnetic mount antenna system. With a twist of the base thumb screw you can change the ¼ wave rods from one frequency range to another or adjust the SWR.

Truly a universal portable antenna system for car, hotel room, apartment or house. The "Super Rod 3" is the answer-all for under $20.00.

THE TUNED ANTENNA CO. ↙57

Prices and/or specifications are subject to change without notice or obligation. Terms: C.O.D., check or money order. Please add $3.00 for first antenna and $2.00 for each additional antenna to cover shipping and handling. California residents add 6% sales tax.

For dealer location or

To order Call (619) 268-0720

VISA

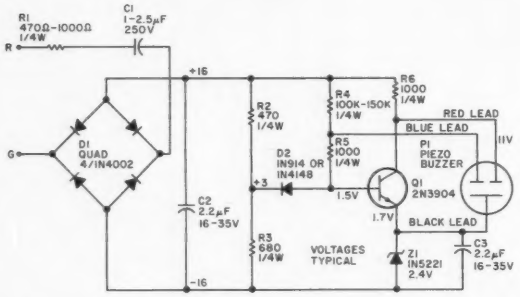
The Tuned Antenna Co. 9520 Chesapeake Dr., #606, San Diego, CA 92123

↙See List of Advertisers on page 114

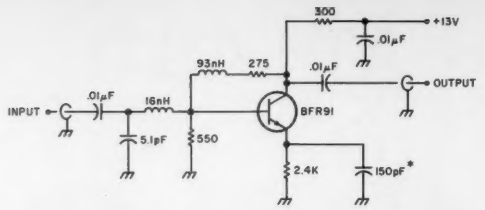
CIRCUITS

Do you have a technique, modification, or easy-to-duplicate circuit that your fellow readers might be interested in? If so, send us a concise description of it (under two pages, double-spaced) and include a clear diagram or schematic if needed.

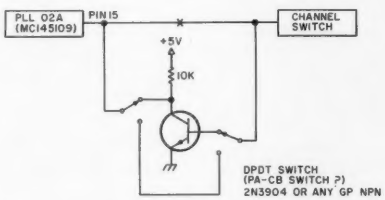
In exchange for these technical gems, 73 offers you the choice of a book from the Radio Bookshop, *to be sent upon publication. Submit your idea (and book choice) to: Circuits, Editorial Offices, 73* Magazine, *Peterborough NH 03458. Submissions not selected for publication will be returned if an SASE is enclosed.*



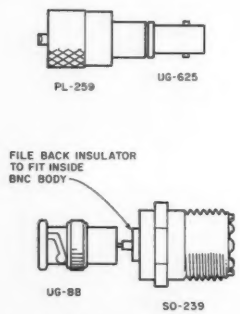
DING-A-LING: This electronic bell needs no power supply. The layout and most of the resistors are not critical, although C2, R2, and R3 work best at the values given. Leaving out R1 will make the unit ring louder. The piezo buzzer may vary from store to store, so if it has two leads, connect the red lead to the collector and the black lead to the emitter of Q1. If a third (blue) lead is present, connect it to the base of Q1.—E. C. Sherrill W5TPP, Fort Worth TX.



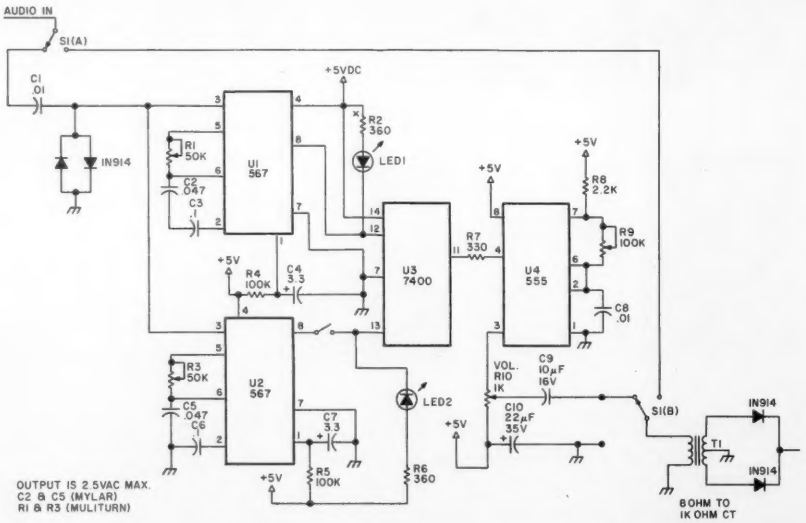
COMPUTER-OPTIMIZED LOW-NOISE BROADBAND AMPLIFIER: Used as a preamp for your tired receiver or to boost levels anywhere in a home-brew project, this amplifier provides 10 dB of gain from 10-600 MHz, and has a 1.5-to-1 match at 50 Ohms. The BFR91 has a 1.5-dB noise figure at 500 MHz, and the circuit requires 13.5 V dc at about 13 mA. The only construction caution is to keep the leads on the 150-pF emitter bypass capacitor as short as possible. I used a chip capacitor with excellent results. The 16-nH coil is 2.5 turns of #26 enamel wire on the shank of a #40 drill. The 93-nH inductor is 10 turns of the same material.—Rick Ferranti WA6NCX/1, Cambridge MA.



USE THOSE MISSING CB CHANNELS: Add more frequencies to your PLL CB-to-10 conversion by adding a switch and a transistor to invert the least significant bit going to the PLL chip. With the switch as shown, you can get 10 kHz above channels 3, 11, and 19, as well as 10 kHz below channels 8 and 16.—Bob Raker WB8ZFF, Cincinnati OH.



BETWEEN-CONNECTOR SERIES ADAPTER: A BNC female (UG-625) fits nicely in a UHF male (PL-259). Just solder a wire to the BNC center and insert it in the body of the PL-259. Solder the center conductor and the seam between the bodies. With just a little more difficulty, an SO-239 can be attached to a BNC male (UG-88). An "F"-type female will thread directly into a BNC male. SMA to BNC (both ways) can be done just as easily.—Bob Raker WB8ZFF, Cincinnati OH.



QRM ELIMINATOR FOR COMPUTER CW: Here is a dandy circuit which will filter out a substantial amount of QRM, enabling a computer to copy CW with ease. The LED on the output could be used to help the hearing-impaired to copy CW. The heart of the circuit is a pair of decoders tuned to slightly different tones which overlap each other. The outputs are fed to a NAND gate, which will key whenever a tone is detected by either detector. The operating bandwidth is now 200 Hz. This circuit will enable you to read CW in bad QRM and with low signal level. The bypass switch is used to check the band without the filter in place. A volume control connected to the output through a headphone or speaker will enable you to monitor the output.—Bill Buckingham WA3LIL, Osceola PA.

QUALITY SPECIALS

MONSTER-SIZED MULTI-PAKS $10.95 each

(You are guaranteed brand new merchandise from manufacturers such as. Seimens, I.C.C., Panasonic, Nichicon, etc.)

PART #	PIECE COUNT	DESCRIPTION
PK001	100	ASSORTED LOW VALUE ELECTROLYTIC CAPACITORS (VARIOUS VALUES LESS THEN 100 MFD)
PK002	40	ASSORTED MEDIUM VALUE ELECTROLYTIC CAPACITORS (VARIOUS VALUES FROM 100MFD to 1000MFD)
PK003	2 DOZEN	ASSORTED HIGH VALUE ELECTROLYTIC CAPACITORS (VARIOUS VALUES FROM 1000MFD to 5000MFD)
PK004	40	ASSORTED LOW VALUE DIPPED TANTALUM CAPACITORS (VARIOUS VALUES FROM 0.1MFD to 2.2MFD)
PK005	2 DOZEN	ASSORTED HIGH VALUE DIPPED TANTALUM CAPACITORS (VARIOUS VALUES FROM 1.0MFD to 68MFD)
PK006	50	LOW PROFILE SOLDER PIN I.C. SOCKETS TEN EACH OF 8, 14, 16, 28, and 40 PIN SOCKETS
PK007	200	LOW VALUE 5% RESISTORS, 1/4 W AT LEAST 35 DIFFERENT VALUES LESS THAN 100 OHMS ARE GUARANTEED
PK008	200	MEDIUM VALUE 5% RESISTORS, 1/4 W AT LEAST 35 DIFFERENT VALUES BETWEEN 100 and 10 MEGOHMS ARE GUARANTEED
PK009	200	HIGH VALUE 5% RESISTORS, 1/4 W AT LEAST 50 DIFFERENT VALUES BETWEEN 10K and 10 MEGOHMS ARE GUARANTEED
PK010	132	SAME AS PK007 BUT RESISTORS ARE 1/2 WATT 5%
PK011	132	SAME AS PK008 BUT RESISTORS ARE 1/2 WATT 5%
PK012	132	SAME AS PK009 BUT RESISTORS ARE 1/2 WATT 5%

MONSTER JR. MULTI-PAKS $2.95 EACH.

ANY OF THE MULTI-PAKS ABOVE ARE AVAILABLE WITH ½ THE PIECE COUNT FOR $2.95 PER PAK. SPECIFY JUNIOR PAK AFTER THE PART NUMBER. THE I.C. SOCKET JR. PAKS AND THE ½ WATT RESISTOR JR. PAKS MAY DIFFER SLIGHTLY FROM THE FULL SIZES PAKS' DESCRIPTION.

SOPHISTICATED I.C.'S

DATA SHEETS AND APPROPRIATE APPLICATION NOTES ARE PROVIDED FREE WITH ALL INTEGRATED CIRCUITS LISTED BELOW

PART # & MANUF.	DESCRIPTION	PRICE(ea.)
RDD104 (LSI COMP. SYS.)	CMOS DIVIDER I.C. HAS TRUTH-TABLE SELECTABLE INPUT TO YIELD DIVIDE BY 10, 100, 1000, or 10000 OUTPUTS	$ [illegible]
LS7031 (LSI COMP. SYS.)	D.C. TO 5MHZ SIX DECADE MOS UP COUNTER WITH 6 DECADE LATCH AND MULTIPLEXED BCD OUTPUTS AND DIGIT STROBES. ACCESS TO LSD LATCHES ALLOWS ATTACHMENT OF PRESCALERS FOR COUNTING TO 50MHZ	$ [illegible]
LS7220 (LSI COMP. SYS.)	14 PIN DIP AUTOMOTIVE MARINE ANTI-THEFT DIGITAL LOCK CIRCUIT HAS 5,040 4-DIGIT COMBINATIONS WITH 25 MICROAMP STANDBY. SAVE MODE FOR VALET PARKING	$ 5.95
ZN450E (FERRANTI)	3½ DIGIT DIGITAL MULTIMETER I.C. WITH LCD DRIVE ON CHIP CLOCK AND REFERENCE. A COMPLETE DVM CIRCUIT CAN BE MADE WITH 6 PASSIVE EXTERNAL COMPONENTS	$14.95
HDSP311D (AND CORP.)	3½ DIGIT LED DISPLAY	$17.95

CAPACITORS

DIPPED TANTALUMS (ea.)	AXIAL ELECTROLYTICS (ea.)	RADIAL ELECTROLYTICS (ea.)
1 mfd 35V $.30	1 mfd 25V $.10	1 mfd 50V $.08
2.2mfd 35V .30	2.2mfd 25V .10	2.2mfd 50V .08
3.3mfd 35V .30	4.7mfd 16V .10	3.3mfd 35V .08
4.7mfd 35V .30	10 mfd 50V .10	10 mfd 50V .08
10 mfd 35V .30	47 mfd 25V .10	47 mfd 16V .08
15 mfd 35V .30	100 mfd 10V .10	100 mfd 16V .08
22 mfd 16V .30	220 mfd 10V .10	470 mfd 25V .10
33 mfd 16V .30	470 mfd 25V .10	1000 mfd 25V .15
68 mfd 10V .30	1000 mfd 25V .15	2200 mfd 16V .15
100 mfd 35V .30	2200 mfd 10V .15	4700 mfd 16V .20
150 mfd 16V .30	4700 mfd 25V .20	10,000 mfd 16V .30
220 mfd 16V .30	10,000 mfd 25V .30	22,000 mfd 16V .50

GOLDSMITH SCIENTIFIC CORPORATION ↙195

P.O. BOX 318 B, COMMACK, NY 11725

PHONE ORDERS WELCOME—(516) 979-7944

MINIMUM ORDER $10.00—U.S. FUNDS ONLY

NEW YORK STATE RESIDENTS ADD SALES TAX

POSTAGE—ADD 5% PLUS $1.50 INSURANCE. C.O.D. $2.00 EXTRA

MASTER CHARGE AND VISA ACCPETED

AVAILABILITY OF CERTAIN ITEMS MAY BE LIMITED

LACOMBE DISTRIBUTORS

Louisiana's Only Authorized ICOM Dealer

Large selection of Amateur and Marine Communications Equipment Available

Call for Quotes

800-336-4799

Lacombe Distributors
Davis & Jackson Road ↙204
P.O. Box 293
Lacombe LA 70445
(504) 882-5355

VISA MasterCard

RTTY - 50

Basic Terminal Unit

- 60 mA Loop Keying
- PLL Demod w/2 pole filter
- AFSK Generator

$79.00

Call or write for FREE catalog with over 65 P.C. Boards & Kits.

RTTY - 100

Expanded Version of the Popular RTTY - 50

- AFSK
- 850/170
- TTL & RS232
- 60 mA Loop
- Loop Supply
- Auto Start
- 4 Pole Filters
- AGC (80db)

$189.00

COMMUNICATIONS DESIGN INC.

1105 Lehr St. — West Memphis, Arkansas 72301

(501) 735-4568

Radio World

CENTRAL NEW YORK'S MOST COMPLETE HAM DEALER

Featuring Kenwood, Yaesu, Icom, Drake, Ten-Tec, Swan, Dentron, Alpha, Robot, MFJ, Tempo, Astron, KLM, Hy Grain, Mosley, Larsen, Cushcraft, Hustler, Mini Products, Bird, Mirage, Vibroplex, Bencher, Info-Tech, Universal Towers, Callbook, ARRL, Astatic, Shure, Collins, AEA. *We service everything we sell!*

Write or call for quote. **You Won't Be Disappointed.**

We are just a few minutes off the NYS Thruway (I-90) Exit 32

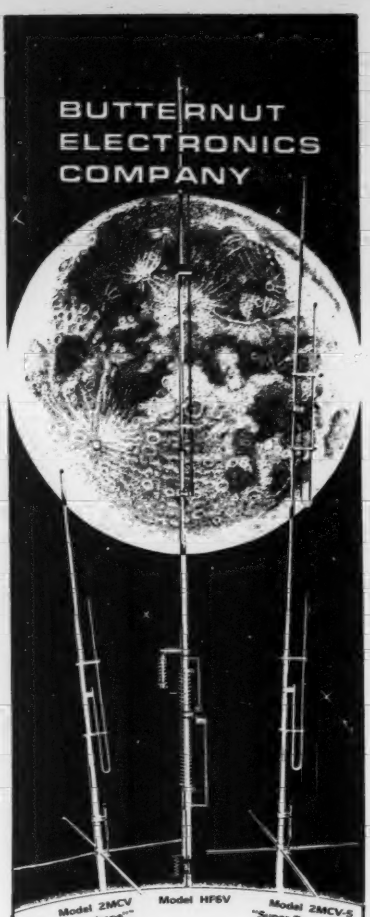
VISA master charge

OUT OF STATE ORDER TOLL FREE 800-448-9338

ONEIDA COUNTY AIRPORT TERMINAL BUILDING
ORISKANY, NEW YORK 13424
N.Y. Res. Call (315) 736-0184 ↙397

Warren - K2IXN
Bob - WA2MSH
Al - WA2MSI

BUTTERNUT ELECTRONICS COMPANY



Model 2MCV "Trombone"™ Model HF6V Model 2MCV-5 "Super Trombone"™

THE WINNERS

Model HF6V - Completely automatic bandswitching 80 through 10 **plus** 30 meters. Outperforms **all** 4- and 5-band "trap" verticals of comparable size. Thousands in use worldwide since December '81! 160 meter option available now; retrofit kits for remaining WARC bands coming soon. Height: 26 ft/7.8 meters; guying not required in most installations.

Model 2MCV "Trombone"™ — omnidirectional collinear gain vertical for 2 meters having the same gain as "double-5/8λ" types, but the patented "trombone" phasing section allows the radiator to remain unbroken by insulators for maximum strength in high winds. No coils "plumber's delight" construction and adjustable gamma match for complete D.C. grounding and lowest possible SWR. Height: 9.8 ft/2.98 meters.

NEW Model 2MCV-5 "Super-Trombone"™ — Same advanced features as the basic 2MCV but a full wavelength taller with additional "Trombone"™ phasing section for additional gain. Height: 15.75 ft/4.8 meters.

All BUTTERNUT ANTENNAS use stainless steel hardware and are guaranteed for a full year. For further information on these and other BUTTERNUT products write for our FREE CATALOG!

BUTTERNUT ELECTRONICS

GARY AIRPORT BOX 356 E RTE 2
SAN MARCOS, TEXAS 78666

↙See List of Advertisers on page 114

HAM HELP

Can anyone provide me with a manual for the Heath model O-10 laboratory oscilloscope? The manual is no longer available from Heath. I will pay all costs or copy and return.

Robert Ross VE3LPJ
4 Meadowland Dr.
Brampton L6W 2R4
Ontario, Canada

Wanted: 220- and 440-MHz boards for a UV-3 transceiver. I will pay a reasonable price for them.

Johnny E. Carr WA4FCC
Route #2
Rockmart GA 30153

Does anyone have a noise-blanker circuit that will work in a National HRO 500?

Bill Blackwell K8LO
180 Woodmere
Detroit MI 48209

I am looking for a new QSL service for outgoing QSL cards. Can anyone help me find one?

Paul Deshamais WA1IPD
22 Cote St.
Somersworth NH 03878

I would like to get a program for Oscars 8 and 9, as well as the RS satellites, for the VIC-20 with 8K. I am also looking for a hook-up to use a Model 33 printer with the computer. I will pay for tapes.

Jim Fyles WB0CZI
820 El Paso Blvd.
Denver CO 80221

I am compiling a list of amateur frequency use, including DX nets, special interest nets, calling frequencies, and band/mode limits. I need details or nets with their designated frequency as well as band limits from 1.8 MHz to 54 MHz.

Ash Nallawalla ZL4LM/VK3CIT
RAAF Academy
Point Cook VIC 3029
Australia

I need the original manual for the Johnson Viking Valiant—no copies, please.

Russ Lawson K1MOU
124 South Grand St.
West Suffield CT 06093

I need schematics and service information for the Knight KG-635 and Precision EG-550B oscilloscopes and the Digicom 800 2-meter radio.

Robert Ball KL7AH
PO Box 74645
Fairbanks AK 99707

I would like to find the manual for a Du-Mont model 304-A oscilloscope. I am willing to buy the manual or copy and return it.

Gordon Fulp W6FBH
4740 Scotch Pine Lane
Placerville CA 95667

I have a small dc motor that has good ball bearings. I want to use it as a drill motor for PC boards. How do I make a chuck to hold a drill bit with a 3/16" shaft?

Patrick Chirington
1478 Grace Ave.
Lakewood OH 44107

I am looking for an early-production-run Kenwood R-1000, preferably pre-1980.

Victor Barz
Rm. 3305 Cross-Baits II
Ann Arbor MI 48109

I need a schematic for the Tennelec model TN 800 scanner. I will pay for any copies.

Chuck McGinty
RR 11 Box 451
London KY 40741

I have a Pace model CB 144 CB radio which I converted to 10 meters. It receives on 10, but transmits on 21.269 MHz. Can anyone tell me how to get it to transmit on 10 meters?

Joe Oden WD8HVM
4129 South Wichita
Wichita KS 67217

I am seeking the schematic and owner's manual for a National NC-303 receiver. I will pay all postage and copying costs.

Jim Pemberton
7324 Oxmoor Dr.
Rt. 20
Knoxville TN 37921

Does anyone know where I can buy or how to make solid-state replacements for the 6X4 and 12AV7/12AX7 tubes?

Kevin Neal
Route A Box 221A
Flippin AR 72634

Can anybody tell me how to take incoming signals for a Motorola teleprinter and convert them to a format usable by a TRS-80 Model I? Any help or suggestions would be appreciated.

David Youngs
519 N. Pine Way
Anaheim CA 92805

CORRECTIONS

An incorrect drawing accompanied "Nicad Charger With Current and Voltage Limiting," which appeared in the "Circuits" feature on page 99 of February's issue. The two bottom diodes in the bridge rectifier should be reversed in order for the circuit to operate properly.

Avery L. Jenkins WB8JLG
73 Staff

AZDEN PCS-4000
ADVANCED MICROCOMPUTER CONTROL - 16 MEMORIES - 25 WATTS - SUPER COMPACT 142-150 MHZ - ANY SPLITS - ONE-YEAR WARRANTY -
ALSO: PCS-300 HT, PCS-2800 10M FM, accessories, etc.

KDK FM-2030
EASY TO OPERATE - SINGLE-KNOB TUNING - RIT - 10 MEMORIES - 25 WATTS - SCAN BAND OR MEMORIES - TT MIC. WITH UP/DOWN FREQ. CONT. - ANY SPLITS BEEPS AT MEMORY BAND LIMITS FOR EYES-OFF OPERATION

Special discounts - call for quote

B. G. CARL ELECTRONICS
11128 Claire Ave. ↙469 Northridge, CA 91326
Call: 1-213-363-1216 (anytime) Bryan AG6R

CONTACT-80...
RTTY your TRS-80 with CONTACT 80 MARK II for 1983!
TRS-80, MOD III INTERFACE (included with system) gives keyboard STATION CONTROL and connects with the TTY TU of your choice.
(No other equipment needed for CW operation)
Cassette & Disk Features:
- BAUDOT, ASCII & MORSE...
- CW RX speed AUTOSYNC & unique FIST-FIXER...
- TRI-SPLIT screen (user sets HIS way)...
- "Unlimited" STORED MSG. sizes...
- Automatic DYNAMIC BUFFER ALLOCATION...
- Live HARDCOPY plus other Line-printing...
- AUTO-ID, TIME/DATED transmissions...
- On screen "OSCILLSCOPE", CLOCK, COUNTERS...
- Unique EDITOR, CLOCKED-KEYING, NAME-LINE...
- AUTO-DIDDLE, K/B ROLLOVER, REPEATING KEYS...
- Fast CASSETTE I/O and many other features...

Additional Disk Features:
- Two-way message SELCALL. A "PERSONAL MSO"...
- AUTO-MONitor frequency activity to disk...
- SAVE, LOAD, KILL & DIR plus other I/O...

INTRODUCTORY SPECIAL
DISK VERSION.....$199.00
CASSETTE VERSION.....$179.00
CASSETTE, later upgrade to DISK.....$20.00
Guaranteed-Include Amateur CALLSIGN-POST PAID
ROYAL ↙150
407 Conkie Road
Hampton, GA 30228 Telephone: (404) 946-9314

NEMAL ELECTRONICS
COAXIAL CABLE SALE
This Month's Specials
Same Day Shipping

RG8U-20 ft., PL-259 ea. end.....$4.95
RG214U dbl silver shield, 50 ohm.....$1.35/ft.
100 ft. RG8U with PL-259 on each end $19.95
BELDEN Coax in 100 ft. rolls
RG58U #9201.....$11.95
Grounding strap, heavy duty tubular braid
3/16 in. tinned copper.....10¢/ft.
3/8 in. tinned copper.....30¢/ft.

POLYETHYLENE DIELECTRIC
RG213 noncontaminating 95% sheild mil spec.36¢/ft.
RG174/U mil spec. 96% shield.....10¢/ft.
RG11U 96% shield, 75-ohm mil spec.....25¢/ft.
RG8U 96% shield, mil spec....$27.95/100 ft. or 31¢/ft.
RG6A/U double shield, 75-ohm.....25¢/ft.
RG58AU stranded mil spec.....12¢/ft.
RG58 mil spec. 96% shield.....11¢/ft

LOW LOSS FOAM DIELECTRIC
RG8X 95% shield (black, white or gray).....$14.95/100 ft. 17¢/ft.
RG8U 80% shield.....18¢/ft.
RG58U 80% shield.....07¢/ft.
RG58U 95% shield.....10¢/ft.
RG59U 100% foil shield, TV type.....$7/100 ft. 10¢/ft.
RG8U 97% shield 11 ga. (equiv. Belden 8214).....31¢/ft.
Rotor Cable 8-con. 2-18 ga, 6-22 ga.....19¢/ft.

CONNECTORS MADE IN USA
Amphenol PI-259.....79¢
PL-259 push-on adapter shell.....10/$3.89
PL-259 & SO-239.....10/$5.89
Double Male Connector.....$1.79
PL-258 Double Female Connector.....98¢
1 ft. patch cord w/RCA type plugs each end.....3/$1.00
Reducer UG-175 or 176.....10/$1.99
UG-255 (PL-259 to BNC).....$3.50
Elbow (M359).....$1.79
F59A (TV type).....10/$2.15
UG 21D/U Amphenol Type N Male for RG8.....$3.00
BNC UG88C/U. male.....$1.25
3/16 inch Mike Plug for Collins etc.....$1.25
UG273 BNC to PL-259.....$3.00

FREE CATALOG
COD add $1.50—FLA. Res. add 5% Sales Tax
Connectors—shipping 10% add'l, 2.50 minimum ↙412
Cable—shipping $3.00 1st 100 ft., $2.00 each add'l 100 ft.
1327 NE 119th Street, Dept. RLO, No. Miami, FL 33161 Call (305) 893-3924

Great Minds Think Alike.

Hertz . . . Marconi . . . Armstrong . . . they all would have read **73**. Why?

Great pioneers get their ideas from great pioneering articles. Armstrong read detailed accounts of Marconi's Cornwall to St. Johns transmission. Marconi was inspired by an article about the experiments of the late Heinrich Hertz. And Hertz was guided in his experiments by the theories of the English mathematician Maxwell.

Throughout its 22-year history, **73** has been a leader in the field of radio communications, publishing more articles that helped to pioneer new areas of amateur radio than any other ham magazine. Articles on single sideband, solid state, repeaters, narrow band communications, satellites . . . the list goes on and on.

Today, the spirit of the pioneer lives on in each and every issue of **73**.

You need **73**.

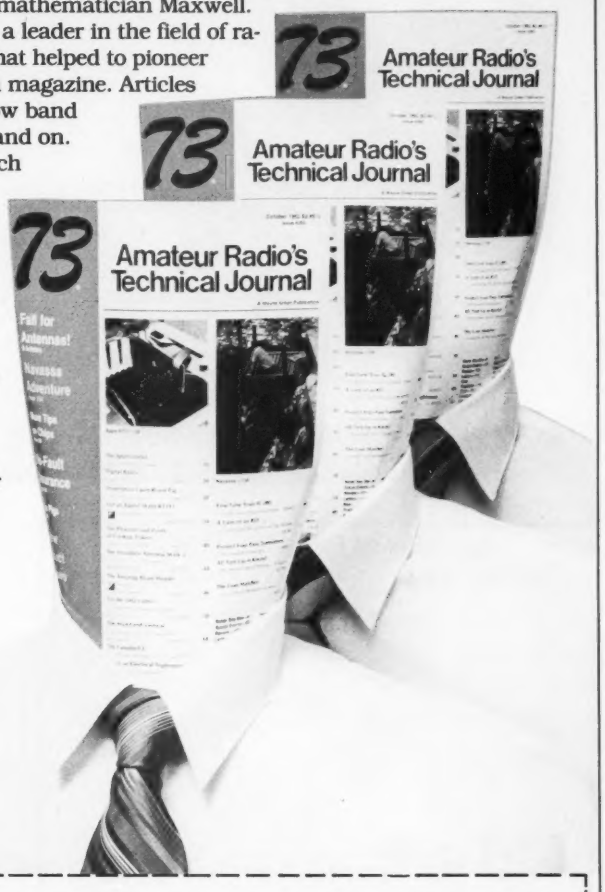
You need it to keep up with the latest radio news. You need it to stay abreast of the most recent technological developments. You need it to find out what your future rig will be like, and how you can modify your present rig to get more out of it, and what the word is on the latest gear, contests, DX . . . You need **73** to help you be the best ham you can be.

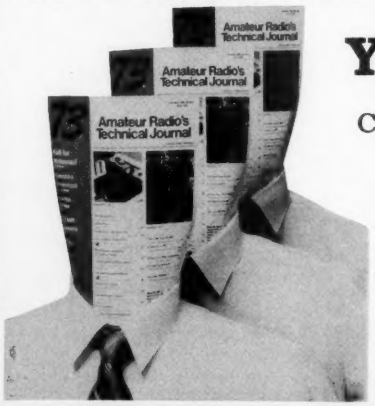
And who knows? Maybe the pioneering articles in **73** will inspire you to heights you never thought you could achieve . . . right up there with Hertz, Marconi, and Armstrong.

To order simply fill out the coupon below and send it in, or dial toll free

1-800-258-5473.

Be a pioneer.
Subscribe to 73.





YES! I want to be a pioneer. Send me 12 issues of **73** for only $19.97. Canada $22.97 US funds. Foreign $39.97 US funds drawn on US bank

Check☐ MC☐ VISA☐ AE☐ BILL ME☐

Card # _____

Interbank # _____ Exp. Date _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

73: Amateur Radio's Technical Journal 334R6
Subscription Dept., P.O. Box 931, Farmingdale NY 11737

Your first issue will arrive in 6 to 8 weeks.

Hi Pro REPEATERS

LB-VHF-UHF

SOON TO BE TYPE ACCEPTED

NEW

Hi PRO TRANSMITTER Designed for Repeater service with excellent stability, harmonic rejection, low sideband noise and audio reproduction. *Up to six channel operation, very cool operation*, adjustable power up to 5 watts on VHF. Also available mounted in die cast aluminum R.F. housing. Can be used with our new 25 watt continuous duty power amplfier.

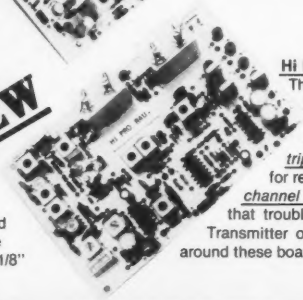
VHF
EV-1B
Assembled
Small Size
3 7/8" × 6 1/8"

NEW

Hi PRO COMPUTER CONTROL BOARD AND AUTO PATCH Here it is, just what you have been asking for—a completely computerized control board and auto patch with auto dialer, tone to rotary dial conversion, repeater, auxiliary receiver or telephone line control. Reverse auto patch, reprogrammable, kerchunk killer, courtesy tone, etc.

HPC
102
Assembled
Small Size
4½" × 6½"

NEW



Hi PRO RECEIVER VHF This is the heart of the Hi Pro Repeater and boasts superior squelch action. Excellent stability, sensitivity .3 uv or less, selectivity, *triple tuned front end* which is needed for reliable Repeater service. *Up to six channel operation.* Excellent replacement for that troublesome Receiver or Transmitter or build your Repeater around these boards.

UHF
R4-UA
Assembled
Small Size
3 7/8" × 6 1/8"

Other Hi Pro Products:
Assembled and tested
Hi Pro Basic—*MKI—MKII Repeaters*
—C.O.R. with smart ID and courtesy tone
—Computerized or basic autopatches
—Tone decoder board-basic repeater control board.

Call for Special Requirements and Systems

MAGGIORE ELECTRONIC LAB.
590 SNYDER AVENUE
WEST CHESTER, PA, 19380
Phone: 215-436-6051
TELEX: 499-0741 MELCO ↙46

CALL OR WRITE FOR OUR COMPLETE CATALOGUE.

ALL NEW H.F. 10/160 METER SOLID STATE P.L.L. TRANSCEIVER

USB-LSB
4 Memories
3 Way Auto-Scan
Includes New Bands
3-Step Tuning Speed
IF Tune ± 1 KHZ
Built-in Dual VFO
Narrow CW filter optional

CW-W CW-N
200 W. PEP (160M-12M)
100 W. PEP (10M)
Built-in Power Supply
AC-120 VAC
DC-13.8 V -Ground
External ALC & Relay

N.C.G. CO.
NCG

Mfg. Sug. Amateur price
$1,059.00

NOW $949.50

JUST SLIGHTLY AHEAD

1275 N. GROVE ST.
ANAHEIM, CA 92806
Cable: NATCOLGLZ

TO ORDER OR
DLR INFO. CALL
(714) 630-4541

↙318

NOTE: Price, Specifications subject to change without notice and obligation

WORK THE U.H.F. BANDS

Add a transverter or converter to your existing 10m, 6m or 2m equipments. Choose from the largest selection of modules available for DX, OSCAR, EME, ATV.

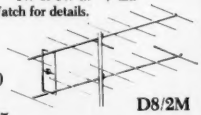
TRANSVERTERS

MMT 50-144 $209.95
MMT 144-28 $199.95
MMT 432-28 (S) $299.95
MMT 439-ATV $349.95
MMT 1296-144 $374.95
OTHER MODELS AVAILABLE
write for details

POWER AMPLIFIERS
all models include RF VOX & Low Noise RX Pre-Ampl.
(no pre-amp in MML432-100)

2 Meters:	100W output	MML144-100-LS	1W or 3W in	$284.95
	100W output	MML144-100-S	10W input	$264.95
	50W output	MML144-50-S	10W input	$239.95
	30W output	MML144-30-LS	1W or 3W in	$124.95
	25W output	MML144-25	3W input	$114.95
432 MHz:	100W output	MML432-100	10W input	$444.95
	50W output	MML432-50	10W input	$239.95
	30W output	MML432-30-L	1W or 3W in	$ ask
1268-1296 MHz:		Coming soon. Watch for details.		

ANTENNAS (incl. 50 ohm balun)



D8/2M

2 Meter J-Beams: 12.3 dBd gain
8 over 8 Horizon'l pol D8-2M $63.40
8 by 8 Vertical pol D8-2M-vert 76.95
1250-1300 MHz Loop-Yagi 1296-LY $49.75
Send 36¢ stamps for full details of all our VHF/UHF items.

Pre-selector filters
Low-pass filters
Varactor triplers
Pre-amplifiers
Transverters
Converters
Antennas
Crystal Filters

VISA
master charge

SI
Spectrum International, Inc.
Post Office Box 1084S
Concord, Mass. 01742 USA
↙436

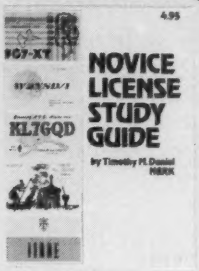
RADIO BOOKSHOP

FOR THE NOVICE

New, updated editions

of our famous novice

license study guide and novice study tapes.



● **NOVICE LICENSE STUDY GUIDE**—by Timothy M. Daniel N8RK. Here is the most up to date novice guide available. It is complete with information about learning Morse Code, has the latest FCC amateur regulations and the current FCC application forms. This guide *is not* a question/answer memorization course but rather it emphasizes the practical side of getting a ham license and putting a station on the air. It reflects what the FCC expects a Novice to know without page after page of dull theory. The most current information still available at last year's price. SG7357 $4.95.*

● **NOVICE STUDY TAPES**—If you are just getting started in ham radio, you'll find these tapes indispensable! This up-to-the-minute revision of the 73 Study Course is the perfect way to learn everything you need to breeze through the Novice written exam. Theory, FCC regulations, and operating skills are all covered, and you'll be amazed at how fast you learn using these tapes!

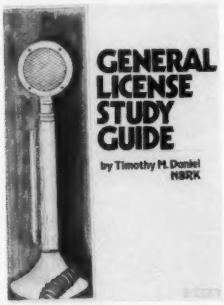
Once the test is behind you, these tapes will go right on being useful, because they are packed with the latest information on setting up your own ham station, and getting on the air.

Thousands of people have discovered how easy learning from cassette can be—order now and enter the fascinating world of ham radio! CT7300 Set of 3—$15.95.*

Scientists have proven that you learn faster by listening than by reading because you can play a cassette tape over and over in your spare time—even while you're driving! You get more and more info each time you hear it. You can't progress without solid fundamentals. These three hour-long tapes give you all the basics you'll need to pass the Novice exam easily. You'll have an understanding of the basics which will be invaluable to you for the rest of your life! Can you afford to take your Novice exam without first listening to these tapes?

Special Offer! Both Novice License Study Guide and Novice Study Tapes $19.95 Order NP7300.

GENERAL LICENSE STUDY GUIDE



GENERAL LICENSE STUDY GUIDE—By Timothy M. Daniel N8RK This is the complete guide to the General License. Learning rather than memorizing is the secret. This is not a question-and-answer guide that will gather dust when the FCC issues a new test. Instead, this book will be a helpful reference, useful long after a ham upgrades to General. Includes up-to-date FCC rules and an application form. Order yours today and talk to the world. SG7358 $6.95

Style W

Style Y

Style X

● **QSL CARDS**—*73* turns out a fantastic series of QSL cards at about half the cost of having them done elsewhere because they are run as a fill-in between printing books and other items in the 73 Print Shop. 250 Style W—QW0250—for $8.95*; 500 Style W—QW0500—for $13.95*; 250 Style X—QX0250—for $8.95*; 500 Style X—QX0500; 250 Style Y—QY0250—for $8.95*; 500 Style Y—QY0500—for $13.95.* Allow 6-12 wks. for delivery.

LIBRARY SHELF BOXES—These sturdy white corrugated, dirt boxes each hold a full year of *73, Microcomputing or 80 Micro.* With your order, request self-sticking labels for any of the following: *73, Microcomputing, 80 Micro, CQ, QST, Ham Radio Personal Computing, Radio Electronics, Interface Age, and Byte.* Order 1—BX1000—for $2.00*; order 2-7—BX2002—for $1.50 each*; order 8 or more—BX1002—for $1.25 each*.

For Your Ham Shack 73 Magazine Binders

● Preserve and protect your collection for a lifetime! Order these handsome red binders with gold lettering. $7.50 for 1, 3 for $21.75, 6 for $42.00. (Postpaid within USA, please add $2.50 per order outside USA.) *Check or money orders only, no phone or C.O.D. orders.* **73 Binders, P.O. Box 5120, Philadelphia, PA 19141.**

***NOTE—Above address for Binders only.**

73 Code Tapes

any four tapes for $15.95! $4.95 each

"GENESIS"

5 WPM—CT7305—This is the beginning tape for people who do not know the code at all. It takes them through the 26 letters, 10 numbers and necessary punctuation, complete with practice every step of the way using the newest blitz teaching techniques. It is almost miraculous! In one hour many people—including kids of ten—are able to master the code. The ease of learning gives confidence to beginners who might otherwise drop out.

"THE STICKLER"

6+ WPM—CT7306—This is the practice tape for the Novice and Technician licenses. It is made up of one solid hour of code, sent at the official FCC standard (no other tape we've heard uses these standards, so many people flunk the code when they are suddenly—under pressure—faced with characters sent at 13 wpm and spaced for 5 wpm). This tape is not memorizable, unlike the zany 5 wpm tape, since the code groups are entirely random characters sent in groups of five.

"BACK BREAKER"

13+ WPM—CT7313—Code groups again, at a brisk 14 per so you will be at ease when you sit down in front of the steely-eyed government inspector and he starts sending you plain language at only 13 per. You need this extra margin to overcome the panic which is universal in the test situations. When you've spent your money and time to take the test, you'll thank heaven you had this back-breaking tape.

"COURAGEOUS"

20+ WPM—CT7320—Code is what gets you when you go for the Extra class license. It is so embarrassing to panic out just because you didn't prepare yourself with this tape. Though this is only one word faster, the code groups are so difficult that you'll almost fall asleep copying the FCC stuff by comparison. Users report that they can't believe how easy 20 per really is with this fantastic one hour tape.

"OUTRAGEOUS"

25+ WPM—CT7325—This is the tape for that small group of overachieving hams who wouldn't be content to simply satisfy the code requirements of the Extra Class license. It's the toughest tape we've got and we keep a permanent file of hams who have mastered it. Let us know when you're up to speed and we'll inscribe your name in 73's CW "Hall of Fame."

BACK ISSUES—Complete your collection; many are prime collectables now, classics in the field! A full collection is an invaluable compendium of radio and electronics knowledge!

73300	73 BACK ISSUE—BEFORE JULY 1980	$ 3.00
73350	73 BACK ISSUE JULY 1980 THRU OCT. 1981	$ 3.50
73350P	73 BACK ISSUE NOV. 1981 TO PRESENT	$ 3.50
73005	73 BACK ISSUE—5 YOUR CHOICE	$10.75
73010	73 BACK ISSUE—10 YOUR CHOICE	$16.00
73025	73 BACK ISSUE—25 YOUR CHOICE	$27.00
73125	73 BACK ISSUE—25 OUR CHOICE	$14.00

Shipping: Please add $1.00 per magazine. Orders of ten magazines or twenty-five magazines add $7.50 per order.

*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to: 73 Radio Bookshop ● Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. $1.50 for the first book, $1.00 each additional book for U.S. delivery and foreign surface. For foreign airmail $10.00 per book. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address. (Prices subject to change on books not published by 73 Magazine.)

FOR TOLL FREE ORDERING CALL 1-800-258-5473

RADIO BOOKSHOP

HAND BOOKS FOR NEW! THE HAMSHACK

AMATEUR RADIO CALL DIRECTORY, 1982-1983 Edition. Compiled by: Jack A. Speer N1BIC and Ashok K. Anand. Here it is, and at a price you can afford! A directory of over 410,000 radio amateurs in the United States (as licensed by the U.S. Gov't). Completely updated for 1983. Easy to handle 8½ × 11 format. BK1254 $12.95

THE TEN METER FM HANDBOOK—by Bob Heil K9EID. This handbook has been published to help the ten meter enthusiast learn more about the many methods of conversions and tricks that are used to make existing units work better. Join the great "tinkerers" of the world on ten FM and enjoy the fantastic amount of fun in communicating with amateur stations worldwide on ten meter FM. BK1190 $4.95.*

THE COMPLETE SHORTWAVE LISTENER'S HANDBOOK, 2nd EDITION by Hank Bennett and Harry L. Helms. This comprehensive volume contains loads of new information from all over the world on the latest developments in SWL technology clubs, associations, practices and stations. A thorough guide to stations of the world by general continental area and frequency is included. BK1241 $9.95

THE PRACTICAL HANDBOOK OF AMATEUR RADIO FM REPEATERS—by Bill Pasternak WA6ITF (author of 73 Magazines monthly column "Looking West") This is the book for the VHF/UHF FMer, compiled from material submitted by over a hundred individuals, clubs, organizations and equipment manufacturers. A "must have" for your ham shack shelf. BK1185 $12.95.*

THE 73 TEST EQUIPMENT LIBRARY

VOL. II AUDIO FREQUENCY TESTERS—Jam-packed with all kinds of audio frequency test equipment. If you're into SSB, RTTY, SSTV, etc., this book is a must for you. . . a good book for hi-fi addicts and experimenters, too! LB7360 $1.95.*

VOL. III RADIO FREQUENCY TESTERS—Radio frequency waves, the common denominator of amateur radio. Such items as SWR, antenna impedance, line impedance, RF output, and field strength; detailed instructions on testing these items includes sections on signal generators, crystal calibrators, grid dip oscillators, noise generators, dummy loads, and much more. LB7361 $1.95.*

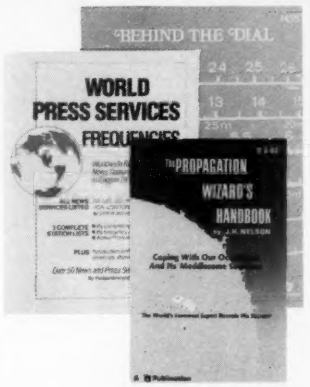
VOL. IV IC TEST EQUIPMENT—Become a troubleshooting wizard! Here are 42 home construction projects for building test equipment to work with your ham station and in servicing digital equipment. Plus a cumulative index for all four volumes for the *73* TEST EQUIPMENT LIBRARY. LB7362 $1.95.*

ALL THREE OF THE ABOVE ONLY $4.95 ORDER LB7365

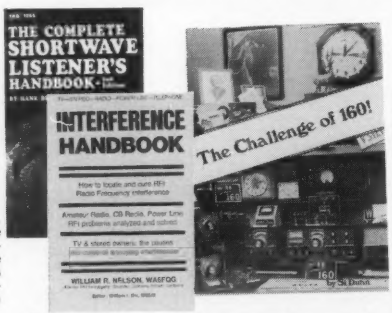
RF AND DIGITAL TEST EQUIPMENT YOU CAN BUILD—BK1044—Rf burst, function, square wave generators, variable length pulse generators—100 kHz marker, i-f and rf sweep generators, audio osc, af/rf signal injector, 146 MHz synthesizer, digital readouts for counters, several counters, prescaler, microwave meter, etc. 252 pages. BK1044 $5.95.*

FOR THE CONTESTER

THE CONTEST COOKBOOK—This book reveals the secrets of that elite group of operators who top the list when the contest results are published. It contains detailed suggestions for the first-time contester as well as tips for the advanced operator. Domestic, DX, and specialty contests are all discussed, complete with photographs and diagrams showing the equipment and operating aids used by the top scorers. For the serious contester. BK7308 $5.95.



THE 73 TECHNICAL LIBRARY



TOOLS & TECHNIQUES FOR ELECTRONICS—by A. A. Wicks is an easy-to-understand book written for the beginning kit-builder as well as the experienced hobbyist. It has numerous pictures and descriptions of the safe and correct ways to use basic and specialized tools for electronic projects, as well as specialized metal-working tools and the chemical aids which are used in repair shops. BK7348 $4.95.*

BEHIND THE DIAL—This book explains, in detail, what's going on on all the frequencies, from shortwave up to microwave. It gives the reader a good idea of what he can find and where to find it, including some of the secret stations such as the C.I.A. and the F.B.I. Everything is covered short of microwave monitoring. Anyone interested in purchasing a shortwave receiver should have a copy of this book. surveillance, station layout consideration, antenna systems, interface, and the electromagnetic spectrum. are included. BK7307 $4.95

THE NEW WEATHER SATELLITE HANDBOOK—by Dr. Ralph E. Taggart WB8DQT. Here is the completely updated and revised edition containing all the information on the most sophisticated and effective spacecraft now in orbit. This book serves both the experienced amateur satellite enthusiast and the newcomer. It is an introduction to satellite watching, providing all the information required to construct a complete and highly effective ground station. Solid hardware designs and all the instructions necessary to operate the equipment are included. For experimenters who are operating stations, the book details all procedures necessary to modify equipment for the new series of spacecraft. Amateur weather satellite activity represents a unique blend of interests encompassing electronics, meteorology and astronautics. Join the privileged few in watching the spectacle of earth as seen from space on your own monitoring equipment. BK7383 $8.95.*

THE CHALLENGE OF 160—The growth of amateur radio today is encouraging the use of 160 meters. All the information necessary to get started on this unique band, the all-important antenna and ground systems are described in detail. Also, how to get on, top-band operating tips, top-band transmitters, propagation, weather receiving equipment, and more are covered in full. The introduction contains interesting photos of Stew Perry's (the King of 160) shack. This reference is useful to new and experienced top-band operators. BK7309 $4.95

INTERFERENCE HANDBOOK—by William R. Nelson, WA6EQG—This timely handbook covers every type of RFI problem and gives you the solutions based on practical experience. Covers interference to TV, radio, hi-fi, telephone, radio amateur, commercial and CB equipment. Power line interference is covered in depth—how to locate it, cure it, work with the public, safety precautions, how to train RF/I investigators. Written by an RFI expert with 33 years of experience, this profusely illustrated book is packed with practical easy-to-understand information. BK1230 $8.95.*

OWNER REPAIR OF RADIO EQUIPMENT—by Frank Glass K6RQ. Here's a book that will teach you an approach to troubleshooting without a shack full of test equipment. Written in a narrative, non-mathematical style, it will encourage you to successfully fix your own rig problems 80 to 90% of the time. Even if you don't want to fix, you can learn a lot about how things work and fail. Add to your library and personal expertise. BK7310 $7.95.*

NEW

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT AMATEUR TELEVISION, (but were afraid to ask)—By Mike Stone WB0QCD. This book is a complete guide to setting up your own amateur radio television station. It contains—A history, what equipment you need, video theory, cameras, recorders, lighting, special effects, sound ATV DXing, mobile FSTV, ATV repeaters, ATV groups, building projects, test equipment, dealer directory, a cumulative index of over 1000 articles on amateur TV and much more. **This is the new, 1982 edition.** From the publishers of *Amateur Television Magazine.* BK1244 $9.95

WORLD PRESS SERVICE FREQUENCIES—by Thomas Harrington Can't wait to hear the evening news, or are you wondering about the news that you *aren't* hearing? Receive by Radio Teletype (RTTY) *all* the world news and financial happenings from the world capitols on a 24 hour a day basis. This book gives you the frequencies and times of broadcast of such news services as AP, UPI, Reuters, TASS, VOA and London Press. Also included is an introduction to RTTY with information on equipment, antennas, abbreviations—everything you need to get started in RTTY. BK1202 $7.95*

SSB. . . THE MISUNDERSTOOD MODE—by James B. Wilson. Single Sideband Transmission. . . thousands of us use it every day, yet it remains one of the least understood facets of amateur radio. J. B. Wilson presents several methods of sideband generation, amply illustrated with charts and schematics, which will enable the ambitious reader to construct his own sideband generator. A must for the technically-serious ham. BK7351 $5.50.*

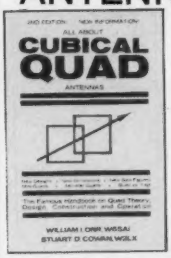
PROPAGATION WIZARD'S HANDBOOK—by J. H. Nelson. When sunspots riddled the worldwide communications networks of the 1940s, John Henry Nelson looked to the planets for an answer. The result was a theory of propagation forecasting based upon interplanetary alignment that made the author the most reliable forecaster in America today. The book provides an enlightened look at communications past, present, and future, as well as teaching the art of propagation forecasting. BK7302 $6.95.*

*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to: 73 Radio Bookshop ● Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. $1.50 for the first book, $1.00 each additional book for U.S. delivery and foreign surface. For foreign airmail $10.00 per book. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address. (Prices subject to change on books not published by 73 Magazine.)

FOR TOLL FREE ORDERING CALL 1-800-258-5473

RADIO BOOKSHOP

ANTENNA BOOKS



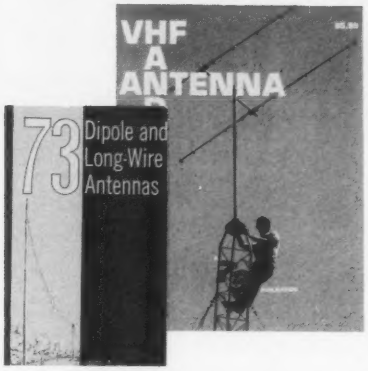
VHF ANTENNA HANDBOOK—The new *VHF Antenna Handbook* details the theory, design, and construction of hundreds of different VHF and UHF antennas . . . a practical book written for the average amateur who takes joy in building, not full of complex formulas for the design engineer. Packed with fabulous antenna projects you can build. BK7368 $5.95.*

ALL ABOUT CUBICAL QUAD ANTENNAS (2nd edition)—The "Classic" on Quad design, theory, construction, and operation. New 2nd edition contains new feed and matching systems and new data. BK1196 $5.95.*

THE RADIO AMATEUR ANTENNA HANDBOOK—All about wire antennas, beams, tuners, baluns, coax, radials, SWR and towers. Clear and complete information. BK1199 $6.95

VHF HANDBOOK FOR RADIO AMATEURS—Contains information on FM theory, operation and equipment, VHF antenna design and construction, satellite-EME, and the newest solid-state circuit. BK1198 $6.59*

SIMPLE, LOW-COST WIRE ANTENNAS FOR RADIO AMATEURS—All new data and everything you want to know about low-cost, multi-band antennas, inexpensive beams, "invisible" antennas for hams in "tough" locations. BK1200 $6.95



73 DIPOLE AND LONG-WIRE ANTENNAS—by Edward M. Noll W3FQJ. This is the first collection of virtually every type of wire antenna used by amateurs. Includes dimensions, configurations, and detailed construction data for 73 different antenna types. Appendices describe the construction of noise bridges, line tuners, and data on measuring resonant frequency, velocity factor, and swr. BK1016 $5.50.*

BEAM ANTENNA HANDBOOK (New 5th edition)—by William I. Orr & Stuart D. Cowan. Yagi beam theory, construction and operation. Information on wire beams, SWR curves and matching systems. A "must" for serious DXers. BK1197 $5.95.

COOK BOOKS

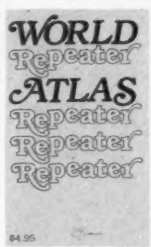
TTL COOKBOOK—by Don Lancaster. Explains what TTL is, how it works, and how to use it. Discusses practical applications, such as a digital counter and display system, events counter, electronic stopwatch, digital voltmeter and a digital tachometer. BK1063 $9.50.*

CMOS COOKBOOK—by Don Lancaster. Details the application of CMOS, the low power logic family suitable for most applications presently dominated by TTL. Required reading for every serious digital experimenter! BK1011 $10.50.*

TVT COOKBOOK—by Don Lancaster. Describes the use of a standard television receiver as a microprocessor CRT terminal. Explains and describes character generation, cursor control and interface information in typical, easy-to-understand Lancaster style. BK1064 $9.95.*

IC OP-AMP COOKBOOK—by Walter G. Jung. Covers not only the basic theory of the IC op amp in great detail, but also includes over 250 practical circuit applications, liberally illustrated. 592 pages, 5½ × 8½, softbound. BK1028 $14.95.*

THE WELL EQUIPPED HAM SHACK



HOW TO DEFEND YOURSELF AGAINST RADAR—by Bruce F. Bogner and James R. Bodnar, a lawyer and radar expert. This book gives you the ammunition to challenge the radar "evidence" that usually leads to a speeding conviction. The major part of the book details the inner workings of radar—you'll become more of an expert than most police officers and judges. The remainder of the book outlines how to defend yourself against a speeding ticket—the observations, measures and testimony you must obtain to defend yourself without the help of a lawyer. The price is a lot less than a fine! BK1201 $6.95.*

MICROCOMPUTER BOOKS

THE SELECTRIC INTERFACE—by George Young. You need the quality print that a daisy wheel printer provides but the thought of buying one makes your wallet wilt. SELECTRIC™ INTERFACE, a step-by-step guide to interfacing an IBM Selectric I/O Writer to your microcomputer, will give you that quality at a fraction of the price. George Young, co-author of *Kilobaud Microcomputing* magazine's popular "Kilobaud Klassroom" series, offers a low-cost alternative to buying a daisy wheel printer. SELECTRIC INTERFACE includes: step-by-step instructions, tips on purchasing a used Selectric, information on various Selectric models, including the 2740, 2980, and Dura 1041, driver software for Z80, 8080, and 6502 chips, tips on interfacing techniques. With SELECTRIC INTERFACE and some background in electronics, you can have a high-quality, low-cost, letter-quality printer. Petals not included. BK7388 $12.97

40 COMPUTER GAMES FROM KILOBAUD MICROCOMPUTING—Forty games in nine different categories. Games for large and small systems, and a section on calculator games. Many versions of BASIC used and a wide variety of systems represented. A must for the serious computer gamesman. BK7381 $7.95*

KILOBAUD KLASSROOM—By George Young and Peter Stark. Learning electronics theory without practice isn't easy. And it's no fun to build an electronics project that you can't use. *Kilobaud Klassroom* the popular series first published in *Kilobaud Microcomputing*, combines theory with practice. This is a *practical* course in digital electronics. It starts out with very simple electronics projects, and by the end of the course you'll construct your own working microcomputer! BK7386 $14.95

HOBBY COMPUTERS ARE HERE!If you want to come up to speed on how computers work—hardware and software—this is an excellent book. It starts with fundamentals and explains the circuits and the basics of programming, along with a couple of TVT construction projects, ASCII, Baudot, etc. This book has the highest recommendations as a teaching aid. BK7322 $2.47.

TEXTEDIT—A Complete Word Processing System in kit form—by Irwin Rappaport. *TEXTEDIT* is an inexpensive word processor that you can adapt to suit your needs, from writing form letters to large texts. It is written in modules, so you can load and use only those portions that you need. Included are modules that perform right justification, ASCII upper/lowercase conversion, one-key phrase entering, complete editorial functions, and much more! *TEXTEDIT* is written in TRS-80* Disk BASIC, and the modules are documented in the author's admirably clear tutorial writing style. Not only does Irwin Rappaport explain how to use *TEXTEDIT*; he also explains programming techniques implemented in the system. *TEXTEDIT* is an inexpensive word processor that helps you learn about BASIC programming. It is written for TRS-80 Models I and III with TRSDOS 2.2/2.3 and 32K. *TRS-80 and TRSDOS are trademarks of the Radio Shack Division of Tandy Corporation. BK7387 $9.97

SOME OF THE BEST FROM KILOBAUD/MICROCOMPUTING—A collection of the best articles that have recently appeared in Kilobaud/MICROCOMPUTING. Included is material on the TRS-80 and PET systems, CP/M, the 8080/8085/Z80 chips, the ASR-33 terminal. Data base management, word processing, text editors and file structures are covered too. Programming techniques and hardcore hardware construction projects for modems, high speed cassette interfaces and TVTs are also included in this large format, 200 plus page edition. BK7311 $10.95.*

THE NEW HOBBY COMPUTERS—This book takes up from where "HOBBY COMPUTERS ARE HERE!" leaves off, with chapters on Large-Scale Integration, how to choose a microprocessor chip, an introduction to programming, low-cost I/O for a computer, computer arithmetic, checking memory boards . . . and much, much more! Don't miss this tremendous value! BK7340 Only $2.47.

WORLD REPEATER ATLAS—Completely updated, over 230 pages of repeater listings are indexed by location and frequency. More than 50 maps pinpoint 2000 repeater locations throughout the USA. Foreign listings include Europe, the Middle East, South America, and Africa. BK7315 $2.00

THE MAGIC OF HAM RADIO—by Jerrold Swank W8HXR. Under various callsigns, W8HXR has been heard on the ham bands since 1919. He has watched amateur radio grow from the days of Model A spark coils to an era of microprocessors and satellite communications. Jerry has responded to calls for help from earthquake-striekn Managua and tornado-ravaged Xenia. Antarctica, one of man's loneliest outposts, has been a bit less lonely, thanks to Jerry's tireless phonepatching efforts. Drawing on his own colorful experiences and those of many other hams, Jerry has compiled this wordpicture of ham radio during the past six decades. BK7312 $4.95

A GUIDE TO HAM RADIO—by Larry Kahaner WB2NEL. What's Amateur Radio all about? You can learn the basics of this fascinating hobby with this excellent beginner's guide. It answers the most frequently asked questions in an easy-going manner, and it shows the best way to go about getting an FCC license. A Guide to Ham Radio is an ideal introduction to a hobby enjoyed by people around the world. BK7321 $4.95.*

WORLD RADIO TV HANDBOOK 1983, 26TH EDITION—This book is the bible of international broadcasters, providing the only authoritative source of exact information about broadcasting and TV stations world wide. This 1981 edition is completely revised, giving comprehensive coverage of short, medium and long wave, 560 pages of vital aspects of world listening. BK1184 $16.50

*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to: 73 Radio Bookshop ● Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. $1.50 for the first book, $1.00 each additional book for U.S. delivery and foreign surface. For foreign airmail $10.00 per book. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address. (Prices subject to change on books not published by 73 Magazine.)

FOR TOLL FREE ORDERING CALL 1-800-258-5473

ADVERTISERS

*Please contact these advertisers directly.
To receive full information from our advertisers please complete the postage-paid card.

R.S. No.		Page
2	AEA/Advanced Electronic Applications	91
40	AEA/Advanced Electronic Applications	96
115	*A5 ATV Magazine*	129
164	A & W Productions	105
448	Advanced Communications International	28
124	Advanced Computer Controls	34
67	Advanced Computer Controls	11
*	Alaska Microwave Labs	57
20	All Electronics	129
216	Alden Electronics	27
*	Amateur Electronic Supply	25
5	Amateur-Wholesale Electronics	18
180	Amateur-Wholesale Electronics	101
334	Amidon Associates	51
169	A. P. Systems	94
71	Applied Invention	57
329	AR Technical Products	42
*	Associated Radio	55
358	Astron Power Supply	47
*	Autek Research	36
*	Auto Connect	17
469	BG Carl Electronics	108, 126
11	Barker & Williamson, Inc.	121
487	Birch Hill Sales	104
*	Blacksburg Group	26
476	Blacksburg Group	103
223	Britt's Two-Way	4
226	Buckmaster Publishing	19, 50, 127
*	Butternut Electronics Corp.	107
187	Call Letter Hats	101
102	Centurion International	57
89	Clutterfree Modular Consoles	59
484	Com-Rad Industries	117
488	Commodore	102
14	Communications Concepts, Inc.	96
362	Communications Concepts, Inc.	91
*	Communications Design	107
462	Communications Electronics Specialties, Inc.	81
15	Communications Specialists	9, 75
222	Computer Applications	119
*	Computer Trader	127
*	Connect Systems	17
184	Contemporary Electronics	19
*	Crown Micro Products	61
232	Current Development Corp.	54
21	Current Development Corp.	55
106	Cushcraft Corp.	73
346	Data Service Co.	83
*	Dayton Hamvention	62
312	Daytapro Electronics, Inc.	31
*	DGM Electronics, Inc.	55
221	Discount Ham Radio	121
425	Doppler Systems	82
*	R. L. Drake	71
219	e-tek	129
483	e-tek	118
453	EGE, Inc.	36, 63
*	Electronic Equipment Bank	61
447	Electronic Hobby Innovations	59
146	Electronic Rainbow Industries, Inc.	42
231	Electronic Rainbow Industries, Inc.	125
172	Encon Corporation	101
400	Engineering Consulting Service	129
85	Faxscan, Inc.	63
218	Ferritronics	26
23	Flesher Corp.	28
323	Fox-Tango Corp.	19, 96
486	C. H. Gaifo	103
229	Gizmo Electronics	34
481	GFS Electronic Imports	116
143	GLB Electronics	41
*	Global Specialties	116
195	Goldsmith Scientific Corp.	107
132	Grand Systems	96
480	Grove Enterprises	116
352	Grove Enterprises	62
31	Hal-Tronix	86
345	Hal Communications	15
*	Ham Radio Center	5
*	Ham Radio Outlet	3
33	Hamtronics, NY	142, 143
460	Handi-Tek	129
485	Handi-Tek	116
303	Heath Co.	10
320	Hoosier Electronics	16
*	Hustler, Inc.	15
*	ICOM	Cov. II
78	Independent Crystal Supply	127
445	Instant Software Amateur Radio Program	79
165	Integrated Electronics	96
*	JK Audio	119
*	Jun's Electronics	51
212	Kalglo Electronics	80
*	Kantronics	23, 102, 119
230	KCS Electronics Corp.	129
*	Kenwood	Cov. IV, 7, 116
*	KLM Electronics	11, 117, 125
204	Lacombe	107
477	Larsen Antennas	102
214	A. Lascurain	34
*	Liberty Electronics	129
236	Macaw Electronics	95
44	Macrotronics, Inc.	66
45	Madison Electronics	96
46	Maggiore Electronic Lab.	110
134	Martin Engineering	83
239	Metrex Associates	127
47	MFJ Enterprises	29
233	MFJ Enterprises	57
234	MFJ Enterprises	59
235	MFJ Enterprises	61
237	MHco	80
48	MHz Electronics	132–141
227	Micro Concepts & Design	15
49	Micro Control Specialties	43
50	Microcraft	91
51	Microlog Corporation	37
52	Mid Com Electronics	66
*	Mirage Communications	77
318	National Comm. Group Co.	110
412	Nemal Electronics	108
137	*Nuts & Volts*	129
479	OK Industries	116
*	*Orbit* Magazine	105
*	P. C. Electronics	11, 121
*	Palomar Engineers	4, 68, 80
159	Parsec Communications	126
182	Peterson Electronics	127
300	Pipo Communications	127
*	Proham Electronics	93
61	*Radio Amateur Callbook*, Inc.	68
397	Radio World	107
454	Radiokit	82
62	Ramsey Electronics	131, 145
156	RF Electronics	39
42	RF Gain, Ltd.	82
171	Ridge Systems Co., Inc.	36
133	Rivendell Associates	103
150	Royal	108
207	Russ Software Ltd.	129
65	S-F Amateur Radio Services	59
500	*73* Advertising	115
	Books	111–114, 123, 127, 128, 130
	Dealer Ad	130
	Moving	130
	Subscriptions	109, 127
	University Microfilms	127
*	Simple Simon Electronics Kits	35
*	Spectronics	144
68	Spectrum Communications	67
436	Spectrum International, Inc.	110
173	Spider Antenna	36
482	Tayco Communications	117
*	Telex Communications	68, 69
*	Ten-Tec, Inc.	95
*	The Antenna Bank	54
449	The Ham Shack	49
205	The Metheny Corp.	80
57	The Tuned Antenna Co.	105
238	Thermax Corporation	63
478	Thermax Corporation	116
104	Trionyx	16
*	Universal Electronics	117
217	Universal Communications	81
189	Universal Software	50
*	V-J Products, Inc.	63
*	Van Gorden Engineering	19
311	Vanguard Labs	127
90	VoCom Products	51
*	W9INN Antennas	78
302	W-S Engineering	101
79	Wacom Products	82
80	Western Radio Electronics	101
83	Yaesu Electronics	Cov. III

73

BOOKS, ETC.

To order, complete the postage-paid card, or itemize your order including detailed credit card information or check and mail to: 73 Magazine/Mail Order Dept./Peterborough NH 03458.

Catalog#	Item	Price
73300	73 BACK ISSUE—BEFORE JULY 1980	$ 3.00
73350	73 BACK ISSUE—JULY 1980 THRU OCT. 1981	$ 3.50
73350P	73 BACK ISSUE—NOV. 1981 TO PRESENT	$ 3.50
73005	73 BACK ISSUE—5 YOUR CHOICE	$10.75
	Add $1.00 per magazine for shipping	
73010	73 BACK ISSUE—10 YOUR CHOICE	$16.00
73025	73 BACK ISSUE—25 YOUR CHOICE	$27.00
73125	73 BACK ISSUE—25 OUR CHOICE	$14.00
	Add $7.50 per order for shipping	
BK1196	ALL ABOUT CUBICAL QUAD ANTENNAS	$ 5.95
BK7384	ANNOTATED BASIC, VOL. 1	$10.95
BK7385	ANNOTATED BASIC, VOL 2	$10.95
BK1197	BEAM ANTENNA HANDBOOK	$ 5.95
BK7307	BEHIND THE DIAL	$ 4.95
BK7309	CHALLENGE OF 160	$ 4.95
BK1011	CMOS COOKBOOK	$10.50
CT7305	CODE TAPE—5 WPM	$ 4.95
CT7306	CODE TAPE—6 + WPM	$ 4.95
CT7313	CODE TAPE—13 + WPM	$ 4.95
CT7320	CODE TAPE—20 + WPM	$ 4.95
CT7325	CODE TAPE—25 + WPM	$ 4.95
CT7394	CODE TAPES (ANY FOUR ABOVE)	$15.95
BK1241	THE COMPLETE SHORTWAVE LISTENER'S HANDBOOK	$ 9.95
BK7308	THE CONTEST COOKBOOK	$ 5.95
BK7381	40 COMPUTER GAMES	$ 7.95
BK1244	EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT AMATEUR TV	$ 9.95
BK7321	A GUIDE TO HAM RADIO	$ 4.95
BK7322	HOBBY COMPUTERS ARE HERE	$ 2.47
BK1201	HOW TO DEFEND YOURSELF AGAINST RADAR	$ 6.95
BK1028	IC OP AMP COOKBOOK	$14.95
BK1230	INTERFERENCE HANDBOOK	$ 8.95
BK7386	KILOBAUD KLASSROOM	$14.95
BK7312	MAGIC OF HAM RADIO	$ 4.95
BK7340	THE NEW HOBBY COMPUTERS	$ 2.47
BK7383	THE NEW WEATHER SATELLITE HANDBOOK	$ 8.95
CT7300	NOVICE THEORY TAPES	$15.95
BK7310	OWNER REPAIR OF RADIO EQUIPMENT	$ 7.95
BK1185	THE PRACTICAL HANDBOOK OF FM REPEATERS	$12.95
BK7302	PROPAGATION WIZARD'S HANDBOOK	$ 6.95
QW0250	QSL CARDS—STYLE W—250	$ 8.95
QW0500	QSL CARDS—STYLE W—500	$13.95
QX0250	QSL CARDS—STYLE X—250	$ 8.95
QX0500	QSL CARDS—STYLE X—500	$13.95
QY0250	QSL CARDS—STYLE Y—250	$ 8.95
QY0500	QSL CARDS—STYLE Y—500	$13.95
BK1199	THE RADIO AMATEUR ANTENNA HANDBOOK	$ 6.95
BK1044	RF & DIGITAL TEST EQUIPMENT	$ 5.95
BK1016	73 DIPOLE & LONG WIRE ANTENNAS	$ 5.50
BX1000	SHELF BOX—1	$ 2.00
BX1001	SHELF BOXES—2-7	$1.50 each
BX1002	SHELF BOXES—8 AND UP	$1.25 each
BK1200	SIMPLE, LOW COST WIRE ANTENNAS FOR RADIO AMATEURS	$ 6.95
BK7311	SOME OF THE BEST FROM KILOBAUD	$10.95
BK7351	SSB THE MISUNDERSTOOD MODE	$ 5.50
SG7357	STUDY GUIDE—NOVICE CLASS	$ 4.95
† SG7358	STUDY GUIDE—GENERAL CLASS	$ 6.95
BK1190	THE TEN METER FM HANDBOOK	$ 4.95
LB7360	TEST EQUIP LIB V2—AUDIO TESTERS	$ 4.95
LB7361	TEST EQUIP LIB V3—RADIO EQUIP	$ 4.95
LB7362	TEST EQUIP LIB V4—IC TEST EQ	$ 4.95
BK7387	TEXTEDIT—WORD PROCESSING KIT	$9.97
DS7387	TEXTEDIT—DISK	$19.97
BK7348	TOOLS & TECHNIQUES	$ 4.95
BK1063	TTL COOKBOOK	$ 9.50
BK1064	TVT COOKBOOK	$ 9.95
BK7382	UNDERSTANDING & PROGRAMMING MICROCOMPUTERS	$10.95
BK7368	VHF ANTENNA HANDBOOK	$ 5.95
BK1198	VHF HANDBOOK FOR RADIO AMATEURS	$ 6.95
BK1202	WORLD PRESS SERVICE FREQUENCIES	$ 7.95
BK1184	WORLD RADIO TV HANDBOOK	$16.50
BK7315	WORLD REPEATER ATLAS	$ 2.00

SHIPPING AND HANDLING CHARGES: $1.50 for the first book, $1 for each additional book for US delivery and foreign surface, $10 per book for foreign airmail.

When we tell prospective advertisers our 73 readership is a $50,000,000 market. . . . they invariably say, "Show me!"

73: AMATEUR RADIO'S TECHNICAL JOURNAL
1982 READER SERVICE QUESTIONNAIRE RESULTS

Q. What is your primary source of information about amateur radio equipment?

Magazines	**90.8%**

Q. Where do you purchase most of your equipment?

Mail Order	**48.4%**
Electronics stores	46.1%

Q. How do you look at the ads in **73** magazine?

I look at almost all the ads	**59.0%**
I look only at color ads	18.8%
I look at about half the ads	13.7%

Q. Have you purchased anything from **73** magazine's advertisers during the last 3 months?

Yes	**59.9%**
No	40.1%

Q. During the next 12 months I plan to spend the following amount on ham radio equipment.

—$100	12.5%
$101—$250	14.0%
$251—$500	**32.3%**
$501—$1,000	24.2%
over $1,000	17.1%

The results of that last question, based on **73** magazine's more than 100,000 readers, figures out to be over $50,000,000 worth of spending in 1983—a market too big to ignore.

For more information on our active readership, call us today at **603/924-7138.**

73 **Amateur Radio's Technical Journal**
Advertising Department
Rt. 101 and Elm Street
Peterborough, New Hampshire 03458

73. Believe it.

NEW PRODUCTS

BATTERY ELIMINATORS FOR HAND-HELDS

Handi-Tek has announced its line of battery eliminators for a variety of hand-held radios. These voltage regulators allow continuous operation of handie-talkies without nicad drain or radio modification.

The eliminators plug into an automobile cigarette lighter and provide a regulated voltage supply for Icom, Kenwood, Yaesu, Wilson, Tempo, and other brands.

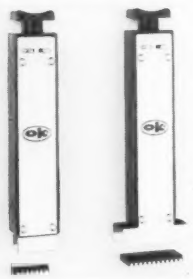
Constructed on glass-epoxy circuit boards from high-quality components, Handi-Tek regulators sport ample heat sinking and a sturdy plastic case.

The six models of eliminators supply a regulated voltage from 8.4 to 10.8 V and, in some cases, may be substituted for the radio's battery pack.

For more information, contact *Handi-Tek, PO Box 2205, La Puente CA 91746.* Reader Service number 485.

IC INSERTERS FOR PC BOARDS

OK Industries, Inc., has just introduced a new series of IC-insertion tools with dimensions optimized for direct insertion into PC boards without sockets. Special long body style facilitates firm grip and thumb action for accurate and comfortable one-hand operation. Rugged nickle-plated steel guides ensure durability and provide static safety, important when using MOS and CMOS ICs. Designed for 14-16-pin ICs (model BBI-1416) and 24-28-pin ICs (model BI-2428). These new inserters are available from stock at local electronics retailers and distributors nationwide, or directly from *OK Industries, Inc., 3455 Conner Street, Bronx NY 10475.* Reader Service number 479.



IC inserters for PC boards from OK Industries.

650-MHZ FREQUENCY COUNTERS

The new Models 6000 and 6500 650-MHz Frequency Counters, introduced by Global Specialties Corporation, offer outstanding performance and ease of operation. The 6000 features a trimlined front panel with optimally accessible controls, push-button operation, bright LED display, and extremely accurate frequency measurement from less than 5 Hz to more than 650 MHz. The standard Model 6000 Frequency Counter has a 3.579545-MHz temperature-compensated crystal oscillator time base. An optional crystal oven oscillator time base is available on the Model 6500.

These frequency counters feature two front-panel-mounted BNC input connectors which allow greater flexibility in frequency measurement. The A input accepts signals from 5 Hz to 1 MHz with an input impedance of 1 megohm @ 25 pF. A switchable low-pass filter, with an LED indicator light, provides a 3 dB per octave rolloff at 60 kHz to facilitate audio and ultrasonic measurements. The B input is used for signals from less than 40 MHz to over 650 MHz with an input impedance of 50 Ohms @ 10 pF. Selection of A or B input is via a simple push-button control with LED indicators.

The 6000 and 6500 also feature three switch-selectable gate times, with simple push-button operation and LED indicators. This enables the user to choose gate times of 0.1 second with 10 MHz resolution, 1 second with 1 Hz resolution or 10 seconds with 1/10 Hz resolution. LED indicators for GATE OPEN and OVERFLOW provide additional user convenience.

The easy-to-read 8-digit LED display features leading-zero blanking, bright 0.43-inch characters, a decimal point in the kilohertz position, and a contrast-enhancement filter to ensure legibility in high ambient light.

The clean, well-designed front panels of the 6000 and 6500 allow ready access to controls and efficient operation. The easy-touch push-button controls include: Stand-by/on switch, Gate time selector, A/B input selector, and Low-pass filter in/out control. A flip-up leg provides added flexibility for benchtop use.

The 6000 and 6500 650-MHz Frequency Counters measure 3 × 10 × 7 inches (H × W × D), weigh 3.5 lbs., and come with a comprehensive instruction manual. For additional information, contact *Global Specialties Corp., 70 Fulton Terrace, PO Box 1942, New Haven CT 06509; (203)-624-3103.*

Global Specialties' Model 6000 Frequency Counter.

Kenwood's TS-430S HF transceiver.

TS-430S HF TRANSCEIVER

The TS-430S, a recent addition to Kenwood's line of high-frequency transceivers, is an all solid-state SSB, CW, and AM transceiver, with FM optional. Designed to cover the 160-10-meter amateur bands, including the new WARC bands, it also incorporates a 150-kHz-30-MHz general-coverage receiver having an exceptionally wide dynamic range. Other features include dual digital vfo's, eight memories, memory scan, programmable band scan, fluorescent tube digital display, all-mode squelch, VOX, speech processor, i-f shift, notch, and a NARROW-WIDE filter-selector switch for use with various optional filter combinations. For additional information, contact your local Kenwood amateur radio dealer, or write to: *Trio-Kenwood Communications, 1111 West Walnut St., Compton CA 90220.*

TC25G ELECTRIC GENERATOR

Thermax Corporation has just released the efficient new TC25G small-scale electric generator. The generator is designed to produce electricity at low rpm's.

The specially designed TC25G is ideal for battery charging in boats, in recreational vehicles, or at remote sites such as Field-Day or repeater locations. It will charge in any system from 6 to 36 V dc. A detailed manual is included with each generator. With each generator sold, Thermax offers free plans to build a wind, water, or pedal-power generating system.

For more information, contact *Thermax Corporation, One Mill St., Burlington VT 05401.* Reader Service number 478.

The TC25G generator from Thermax Corporation.

225-400-MHZ SCANNER CONVERTER

An improved 225-400-MHz scanner converter has been announced by Grove Enterprises. The new CVR-1B Scanverter includes a built-in preamplifier for increased sensitivity and allows complete coverage of the 225-400-MHz military/federal government aircraft band when used with a standard aircraft band scanner.

The unique Scanverter makes it possible for scanner listeners to hear NASA space shuttle support, military tactical communications, Coast Guard missions, federal government agencies in flight, and more.

An exclusive Grove Enterprises development called "bandstacking" allows the entire 175-MHz-wide UHF aircraft band to be compressed into the 118-136-MHz range, tunable on any scanner capable of standard aircraft reception. No tuning or adjustments are necessary with the fully automatic converter.

Reception for hundreds of miles is possible with the use of an outside antenna. Additional features of the Scanverter include:

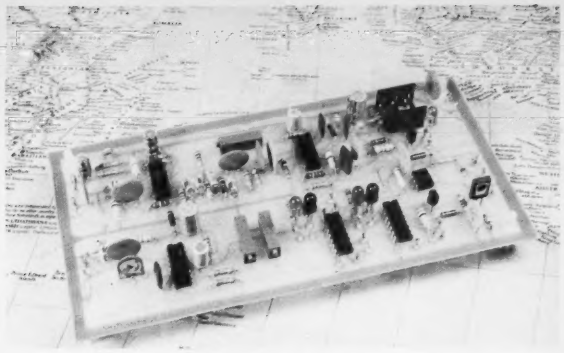
- high-sensitivity, low-noise microstripline circuit
- all metal cabinet for superior shielding
- double-balanced mixer for reducing images
- nine-pole filter for suppressing out-of-band interferences
- crystal oscillator for providing high stability
- zener diode voltage regulation to limit drift
- powered by convenient 12 V dc

A handy list of active nationwide UHF aircraft channels is included. The Scanverter comes complete with power cord, interconnect cable, and full instructions.

For additional information, contact *Grove Enterprises, 140 Dog Branch Road, Brasstown NC 28902; (800)-438-8155 (except NC). All others call (704)-837-2216.* Reader Service number 480.

RADIOTELETYPE AFSK MOD/DEMOD

Now available from GFS Electronic Imports of Mitcham, Victoria, Australia, is the MDK-17 RTTY mod/demod terminal unit. It is designed for HF and VHF amateur radio and/or commercial use at baud rates of 45 to 50 with a shift of 170 Hz. Other baud rates and shifts may be accommodated, but some component changes are necessary. The MDK-17's unique design makes for simple hookup to transceiver, Teletype®, and/or computer terminal. Its 10 ports provide for all combinations of TTL and high-



RTTY AFSK mod/demod terminal unit from GFS Electronic Imports.

voltage 20-60-mA send-receive systems. An open collector output allows direct keying of HF transceivers.

State-of-the-art circuitry is used throughout its design including the XR2211 IC which combines both limiter and active bandpass filter in the one package. The tone generator uses an XR2206 IC which allows for excellent temperature stability. Accurate setting of tone frequencies and demodulator center frequency is provided for by using 15-turn trimpots in these critical areas.

Other features include the provision to invert the signal sense in both the send and/or receive modes. LEDs are used to indicate transmitted tone and correct receiver tuning. An auto start output is available for driving TTL circuitry. Only a single +12-volt supply is required as the power source.

The kit is supplied with comprehensive easy-to-follow assembly instructions. Approximately two hours is required to assemble and test it.

For further information, contact *GFS Electronic Imports, 15 McKeon Road, Mitcham, Victoria 3132, Australia; (03)-873-3939.* Reader Service number 481.

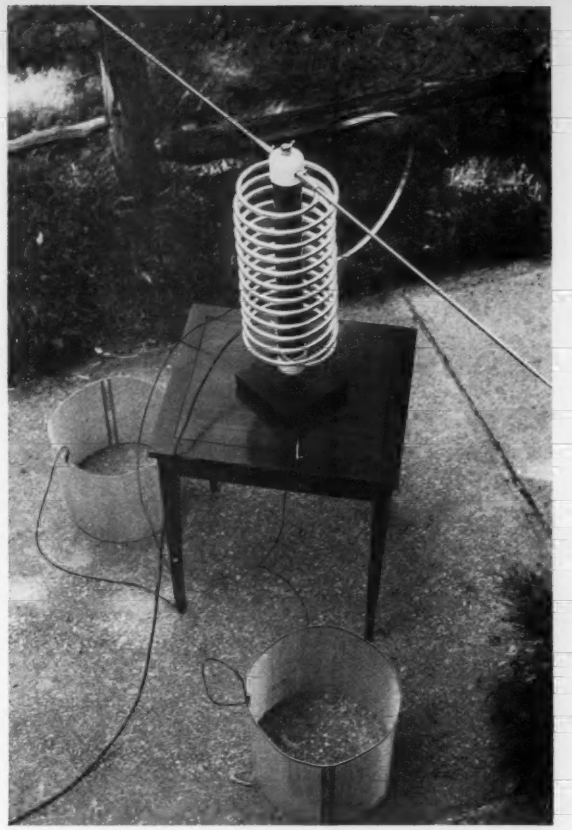
HT POWER AMPLIFIERS

Mirage Communications' pocket-size B23 (2-meter) and C22 (220-MHz) power amplifiers, ever-popular with HT users and experimenters, have been upgraded for even greater versatility. A new power switch permits selection of full amplifier power on a non-energized bypass mode when only HT power is desired. The FM/SSB switch controls choice of rapid or delayed relay action. Power amplification is linear in either mode. The B23 produces 30 Watts (minimum) for 2 Watts in, 15 Watts for 1 Watt, etc. The C22 produces 20 Watts (minimum) for 2 Watts in, 10 Watts for 1 Watt, etc. Duty cycle of both amps is continuous. The B23 and C22 are made in the US and carry a 5-year general warranty with 1 year for power transistors.

For further information, contact *KLM Electronics, Inc., PO Box 816, Morgan Hill CA 95037; (408)-779-7363.*

HI-RIZER ANTENNA

Com-Rad Industries is introducing an even lower profile version of their popular Hi-Rizer restricted-space antenna. The height has been reduced from 20 to 15 inches to enable the portable/fixed antenna to be operated mobile! 40 through 10 meters are obtainable by the use of a 5-inch-diameter magnetic connection base or a vice-grip connection base with large metal surfaces such as automobiles, balcony rails, etc. A portable cylinder ground-plane system is available for use where metal surfaces don't exist. Construction consists of 3/8-inch-diameter aluminum tubing and stainless steel hardware throughout. For more information, contact *Com-Rad Industries, 1635 West River Parkway, Grand Island NY 14072; (716)-773-1445.* Reader Service number 484.



Hi-Rizer restricted-space antenna from Com-Rad Industries.

MULTI-MODE CODE RECEIVER

Universal Electronics has announced the new Universal M-600 multi-mode code receiver. The M-600 receives RTTY sent with bit inversion, TOR, SITOR, and nonstandard shifts. It also will be capable of copying AMTOR as soon as that mode is approved.

The M-600 also can receive all speeds of Baudot, ASCII, and Morse-code transmissions. Special features include an automatic speed search for ASCII and Baudot which will automatically find and lock onto the speed of the received signal.

The video output includes a 64-character ASCII set, a 5 × 7 dot-matrix display, and four formats. The cursor may be turned on or off, and the display also has automatic scrolling capability.

The printer interface includes a 2K buffer which allows downconverting and printer handshaking. An optional 60-mA/20-mA auto-adjusting loop supply is also available for the M-600.

For additional information, contact *Universal Electronics, Inc., 1280 Aida Dr., Reynoldsburg OH 43068; (614)-866-4605.*

CATV CONVERTER

Tayco's new Magnavox FV-25 CATV converter includes a 25-channel capacity and a remote control for easy use.

The FV-25 consists of the push-button remote control unit (housed in a high-impact plastic enclosure) and the con-

Upgraded B23 power amplifier.

The M-600 multi-mode code receiver from Universal Electronics.

verter, which is designed to be easily mounted near the television.

The converter provides up to 9 dB of gain, enabling distant location of the unit from the TV receiver. It has been designed to avoid interference from direct pickup of strong local signals. Input and output terminals are threaded, coaxial 75-Ohm F-type.

The remote control is connected by a 25-foot, two-wire shielded extension cable. The 13 push-button switches select the appropriate channel within either band, and the fine-tuning control permits minute picture adjustments.

For additional information, contact *Tayco Communications, R3-146A Narrows Ck. Rd., Corning NY 14830; (607)-962-7313.* Reader Service number 482.

DIGITAL WATTMETER

E-tek, manufacturer of digital frequency readouts, has announced the introduction of a new digital directional wattmeter. The Model 2022 HF Directional Wattmeter features a high-contrast LCD readout of both forward and reflected power from 5 to 1999 Watts. Both the 199.9- and 1999-Watt scales provide an impressive improvement in resolution and readability when compared with conventional analog wattmeters. A new diode pre-biasing technique enhances accuracy over the entire 1.5-to-30-MHz frequency range.

Connected by an unpluggable cable to a remote rf sampler, the attractive readout unit measures only 3.6" W × 2.1" H × 4.0" D. The heavy 20-gauge steel cabinet is protected by a black, multiple coat, polyurethane finish accented by the brushed aluminum and black photo-anodized front panel. The high-contrast 0.5-inch black LCD digits are easily read from across the room.

Power for the Model 2022 HF Directional Wattmeter is provided by a standard 9-volt transistor radio battery rated for at least six months under normal use. Battery life is maximized by the use of a unique new low-power multiplier circuit and further enhanced by an rf-detecting automatic disconnect circuit.

Digital wattmeter and remote rf sampler from e-tek.

For further information, contact *e-tek, PO Box 625, Marietta OH 45750; (614)-374-2280.* Reader Service number 483.

CONTESTS

Robert Baker WB2GFE
15 Windsor Dr.
Atco NJ 08004

CARF PHONE COMMONWEALTH CONTEST

Starts: 1200 GMT April 9
Ends: 1200 GMT April 10

This contest is open to amateurs in all countries of the Commonwealth of Nations. Entrants may work other amateurs in the Commonwealth using SSB only, on 80- through 10-meter bands. Work only stations outside your own call area. Each station may be worked once on each band. There is one entry class for single-operator stations in all- or single-band classes.

EXCHANGE:

RS report and a consecutive serial number, starting with 001.

FREQUENCIES:

3600, 3760, 7080, 14130, 21200, 28480 plus or minus 20 kHz.

SCORING:

Each completed contact will score 5 points. In addition, a bonus of 20 points may be claimed for the first, second, and third contacts with each Commonwealth call area on each band.

AWARDS:

A plaque will be awarded to the top scoring allband entry. Certificates will be awarded to top scorers in each class in each Commonwealth call area.

ENTRIES:

A valid entry must include log sheets, dupe sheets, a checklist of Commonwealth call areas worked on each band, and a summary sheet showing claimed QSO and bonus points as well as final claimed score calculations. Summary and call-area checklist sheets are available for an SASE. Entries should be mailed within one month of the contest to: CARF, PO Box 2172, Station D, Ottawa, Ontario, K1P 5W4 Canada. Results will appear in *TCA*, the Canadian amateur radio journal. Nonmembers of CARF may wish to include an SASE with their entries for a copy of the results.

HOLIDAY IN DIXIE QSO PARTY

1800 to 2300 GMT April 16

Holiday in Dixie is an annual 10-day celebration held in Shreveport, Louisiana, commemorating the Louisiana Purchase. The event was first organized in 1947 and the QSO party event began in 1978. The radio amateurs set up stations at Hamel's Amusement Park on the Red River in Shreveport and operate 40 through 10 meters. For CW, look around the lower 60 kHz of each band. For SSB, check 7240, 14280, 21380, 28580.

Holiday in Dixie provides commemorative certificates to hams establishing 2-way contact with one of the HID stations. All that is required is sending a QSL card verifying the contact to Holiday in Dixie QSO Party, PO Box 1485, Shreveport LA 71164. Be sure to include signal report and the name and call of the HID operator you contacted. Don't forget an SASE!

In addition to the certificate, a commemorative doubloon will be sent to the first 100 stations. These doubloons are thrown out at the Classic Parade by HID vice presidents in downtown Shreveport.

ARBOR DAY CELEBRATION

Starts: 2400 GMT April 22
Ends: 0600 GMT April 25

A special events station will be operating from the Nebraska State Arbor Lodge, former home of J. Sterling Morton, founder of Arbor Day, in Nebraska City, Nebraska, during the annual Arbor Day Celebration. This station, in addition to other club member stations, will be operating in the general portion of the phone and CW bands on 80 through 10 meters. All amateurs contacting this station or any other club member station during this time will be eligible to receive an Arbor Day commemorative certificate from the Nebraska City Amateur Radio Club. Please send one dollar and a business size SAE to: Nebraska City Amateur Radio Club, Box 8, Nebraska City NE 68410.

QRP ARCI SPRING QSO PARTY

Starts: 1200 GMT April 23
Ends: 2400 GMT April 24

Stations may be worked once per band and mode for QSO multiplier credits. Participants may operate a maximum of 24 hours during the contest period.

EXCHANGE:

Members—RS(T), state-province-country, and QRP ARCI membership number.

Nonmembers—RS(T), state-province-country, and power output.

SCORING:

Each member QSO counts 5 points regardless of location. Nonmember QSOs are 2 points with US and Canadian stations; others, 4 points each. Multipliers are as follows: 4-5 Watts CW or 8-10 Watts PEP. . . ×2, 3-4 Watts CW or 6-8 Watts

CALENDAR

Apr 9-10	CARF Phone Commonwealth Contest
Apr 9-10	ARRL QSO Party—CW
Apr 16	Holiday in Dixie QSO Party
Apr 16-17	ARRL QSO Party—Phone
Apr 22-25	Arbor Day Celebration
Apr 23-24	QRP ARCI Spring QSO Party
May 21-22	Armed Forces Day Communications Tests
Jun 11-12	ARRL VHF QSO Party
Jun 25-26	ARRL Field Day
Jul 9-10	IARU Radiosport Championship
Jul 15-17	*A5 Magazine* SSTV DX Contest
Aug 6-7	ARRL UHF Contest
Aug 19-21	*A5 Magazine* UHF FSTV DX Contest
Aug 20-21	SARTG Worldwide RTTY Contest
Sep 10-11	ARRL VHF QSO Party
Oct 8-9	ARRL QSO Party—CW
Oct 9-10	ARRL QSO Party—Phone
Oct 15-16	ARRL Simulated Emergency Test
Nov 5-6	ARRL Sweepstakes—CW
Nov 19-20	ARRL Sweepstakes—Phone
Dec 3-4	ARRL 160-Meter Contest
Dec 10-11	ARRL 10-Meter Contest

RESULTS

1982 SARTG WORLDWIDE RTTY CONTEST

SINGLE OPERATOR TOP EIGHT CLASS A

ON4UN	455,655
OH2NP/OH0	179,280
DJ6JC	173,160
DK8NG	173,130
YU2CDS	165,900
YUZ5DL	156,390
WB5HBR	135,415
KB2VO	117,180

MULTI-OPERATOR TOP FIVE CLASS B

OH2AA	187,920
Y21BB/a	74,025
OK1OAZ	60,300
OK3KGI	44,345
HA6KVD	14,580

SHORTWAVE LISTENERS TOP FIVE CLASS C

DE4TTY	208,350
OZDR-2135	157,465
Y2-2814/M	117,375
OK1-12880	79,040
OK1-23185	73,710

STATION CONTROL COMPUTER FOR LESS THAN $160

Combine I/O board @ $59.95 with Sinclair Computer @ $99.95 which will provide you with hardware for the following applications.

FOR EXAMPLE:
- Control satellite tracking equipment
- Rec & xmit RTTY & morse code
- Perform station logging
- Automatic contest duplication sheet
- Repeater controller

FEATURING:
Parallel I/O port (expandable)
90 day warranty

I/O Board with our Real Time Clock/Calendar

Time	Month	Date	Year	Day of Week
23:59:59	12	31	99	7

Future Products
- Touch Tone™ encoder/decoder
- Speech and Sound synthesizer

MODEL Built & Tested	MODEL Bare PCB & Manual	DESCRIPTION	PRICE
310	315	MASTER I/O WITH CLOCK	$59.95 $24.95
		MODEL 310 ACCESSORY BOARDS	
320	325	A to D and D to A converter	$47.95 $19.95
330		Wireless control system (BSR™)	$69.95
340		Solid State AC Relay	$19.95
		SPECIALIZED PARTS FOR MODEL 315	
316		Sinclair edge connector, 46 pin w/key	$12.95
317		Clock IC and crystal (tested)	$ 4.95

California residents add 6% Shipping and handling $ 3.95

Send self addressed stamped envelope for catalog.

VISA/MASTERCARD

JK AUDIO
P.O. Box 3295
Escondido, CA.92025-0580
(619) 741-5132 (24 Hr. Order Line)

The Code Reader That Sends

Mini-Terminal™
suggested price $299.95

All in one package—CW, RTTY, ASCII send/receive and hard copy capability for under $300. Unbelievable, but true! Again, **Kantronics** puts all the features you want in a single unit: The **Kantronics Mini-Terminal.**™

You send CW with your key or keyboard, and the **Mini-Terminal**™ converts to RTTY or ASCII. **Mini-Terminal**™ also reads all incoming CW, RTTY, and ASCII messages and reads out on a bright green 10-digit display. For hard copy simply attach any Centronix compatable printer, such as the Epson MX-80 or the Paper Tiger, and watch the **Mini-Terminal**™ do the rest.

A complete code reader and RTTY terminal, with printer compatability all in one package only 2½"x5"x5¼". Get all you can for your dollar; get the **Kantronics Mini-Terminal.**™

See your local **Kantronics** dealer, or contact

Kantronics
(913) 842-7745 1202 E. 23rd Lawrence, Kansas 66044

Have You Ever Used Satellites?
Let the Pathfinder Series FROM

✓222

Computer Applications

Make It Easy For You

Pathfinder II
A Satellite Tracking Package For The Apple II Plus™

Has a world AND a US map and can print BOTH on your Epson MX™ printer. Tracks in real time w/o a clock. SYSTEM REQUIREMENTS: Apple II Plus, 48K RAM, DOS 3.3.

THESE EASY TO USE AND UNDERSTAND PACKAGES ENABLE YOU TO: (1) Track circular orbit satellites in real time on a world map. (2) Print all data tables on your printer. (3) Rapidly predict accessible orbits, reference orbits and all orbits between your specified dates. (4) Rapidly compute AOS time, LOS time, time in range, maximum elevation, CPA time, and CPA range. (5) Maintain a disk resident data base of satellite reference data.

Pathfinder II is provided on a DOS 3.3 disk and Pathfinder III is on a TRSDOS 1.3 disk. Both have a comprehensive users manual.

Pathfinder III
A Satellite Tracking Package For The TRS 80 Mod III™

Pathfinder III can track TWO satellites simultaneously!! SYSTEM REQUIREMENTS: TRS 80 MOD III, 48K RAM, TRSDOS 1.3.

All this is included for only
$34.95

Please add $2.00 for shipping and handling (California residents add 6% ($2.10) sales tax).

Send Check or Money Order To:
COMPUTER APPLICATIONS
3628 A Court, Oxnard, CA 93033

✓See List of Advertisers on page 114

RESULTS

1982 OHIO QSO PARTY

OUT-OF-STATE WINNERS

AE3Y	MD/DC	26,904
K9GDF	WI	6,286
WA4ZSN	NC	4,394
KA4RVA	GA	3,892
KC0CP	IA	3,575
KS8Q	MI	3,135
W5WG	LA	2,976
KG9Z	IL	2,800
W8VEN	W. VA	2,772
KJ9R	OK	2,430
WB2IPX	W. NY	1,962
WA3JXW	E. PA	1,746
WA8GKH/4	TN	1,725
VE3KK	ONT	1,722
K4DDB	N. FL	1,622
W8IEC	MI	1,440
N0CLV	KS	1,300
WB5EUC	S. TX	1,240
N3CDV	DE	923
WA0DXZ/5	MS	532
WB2DND	N. NJ	506
WB1GLH	MA	460
WA4PGM	VA	301
W5PWG	N. TX	176
KC0UM	ND	150
WB3IFF	W. PA	144
AK7J	AZ	126
KD4PP	TN	112
KN7L	WA	109
N9DIJ	WI	48
W5EYF	S. TX	32
KA7GXO	NV	10

OHIO WINNERS

WD8MZZ	1,393,704
KJ3O/8	1,042,808
KW8N	1,009,296
KC8JH	532,060
KA8HXX	346,053
KR8M	255,432
KT8I	112,230
W8DXT	89,523
KA8NIE	64,944
WD8OYF	42,692
N8AKF	38,275
WB8CXL	31,444
K8IP	28,444
WA8WFX	12,180
KC8SD	10,703
WD8MGO	9,702
KC8YL	2,100
WB8YEW	1,952
W8EAD	539
KC8QK	352

Club Station Score

W8VPV	153,164

PEP. . . ×4, 2-3 Watts CW or 4-6 Watts PEP. . . ×6, 1-2 Watts CW or 2-4 Watts PEP. . . ×8, less than 1 Watt CW or 2 Watts PEP. . . ×10. Entries from stations running more than 5 Watts output CW or 10 Watts output PEP will count as check logs only. Stations are eligible for the following bonus multipliers: if 100% natural power (solar, wind, etc.) with no storage, ×2; if 100% battery power, ×1.5. Final score is total QSO points times total number of states-provinces-countries per band times the power multiplier times the bonus multiplier (if any).

FREQUENCIES:

CW—1810, 3560, 7040, 14060, 21060, 28060, 50360.

SSB—1810, 3985, 7285, 14285, 21385, 28885, 50385.

Novice/Tech—3710, 7110, 21110, 28110.

All frequencies plus/minus to clear QRM. No 30-meter contacts will be counted!

AWARDS:

Certificates to the highest scoring station in each state, province, or country with 2 or more entries. Entries automatically considered for annual Triple Crown of QRP Award.

LOGS AND ENTRIES:

Separate log sheets are suggested for each band for ease of scoring. Send full log data, including full name, address, and bands used plus work sheet showing details and time(s) off air. No log copies will be returned. All entries desiring results and scores please enclose a business size envelope with return postage for one ounce or an IRC. It is a condition of entry that the decision of the QRP ARCI Contest Chairman is final in case of dispute. Logs must be received by May 21st to qualify. Send all logs and data to: QRP ARCI contest chairman William W. Dickerson WA2JOC, 230 Mill Street, Danville PA 17821.

The Minuteman

NEWSLETTER OF THE MONTH

From an area rich in Revolutionary War history comes this month's newsletter contest winner—*The Minuteman*, bulletin of the Minuteman Repeater Association, based in Lexington, Massachusetts.

This is a jam-packed newsletter for a vigorous and versatile club. The MMRA operates several repeaters in eastern Massachusetts, runs an active public service system, and involves itself in the technical education of its members. And there is a space for all of these activities in *The Minuteman*.

It is not unusual for *The Minuteman* to run 10 to 12 pages long, and little space is wasted. The reporting in the newsletter is succinct and informative. One recent issue contained an article on the care and feeding of nicads as well as an in-depth look at the status of MMRA's newest repeater. This article included not only what was done to the repeater and why, but it also contained oscilloscope-generated graphics illustrating key points of the machine's operation.

The issue also included an up-to-date listing of the middle-eastern New England repeaters and news of upcoming and past public service activities.

But all is not stuffed-shirt. One-liners are judiciously sprinkled throughout the newsletter, and the comments of the columnists are evidence that this club does not let business interfere with levity.

Congratulations to *Minuteman* Editor Bill Shaughnessy WB1GVA for his fine work.

To enter your club's newsletter in *73*'s contest, just send it to *73*, Pine Street, Peterborough NH 03458.

TSRAC SCAVENGER HUNT CONTEST

Starts: 0000 GMT April 23
Ends: 2359 GMT April 24

Sponsored by the Triple States Radio Amateur Club, this contest is based on the old-fashioned scavenger hunt in which each person was given a list of items to find and the person who found all or most of the items was declared the winner. CW and phone contacts are both allowed.

EXCHANGE:

Normal QSOs or "CQ TSHT TEST."

FREQUENCIES:

20 kHz above the bottom of any General or Novice band.

SCORING:

The scoring is the unique part of the contest. You make points by finding and making contacts in specified geographic areas. Contact with 7 of the 10 call areas is worth 10 points, with 1 point for a duplicate area contact and a 15-point bonus for making contact with all 10 call areas. One QSO with a Canadian station is worth 5 points, with 1 more point given for each additional Canadian contact. A contact with a 1×2 or 2×1 callsign is worth 5 points, and 1 point is given for each additional QSO. The first contact with a 2×2, 1×3, or 2×3 US callsign is worth 5 points, with an extra point for each additional contact. A QSO with any DX station except Canada nets 10 points and a 2-point bonus for subsequent contacts. The first QSO with a TSRAC member is worth 5 points, and there is a 2-point bonus for each subsequent contact. One contact on each band from 80-10 meters (except 20 and 30) gets 10 points, and the first QSO with a YL is worth 15 points, with 3 points given for each subsequent contact. 100 bonus points are given if the contestant scores on all 10 items.

ENTRIES:

Send your entry no later than May 25 to contest chairman David M. Kinney KC8YR, RD #1, Mingo Junction OH 43938.

AWARDS

Bill Gosney KE7C
Micro-80, Inc.
2665 North Busby Road
Oak Harbor WA 98277

THE WAVO AWARD

WAVO (Worked All VO) is available to any amateur not a resident of Newfoundland or Labrador, operating from one call area, who can show proof of two-way contact with forty different stations operating fixed, portable, or mobile in the province. One of these stations must be using a VO2 Labrador prefix.

WAVO is also available to all VO, VO mobile, or VO portable stations operating either VO1 or VO2 (not both in one application) that can show proof of two-way contact with sixty different stations operating fixed, portable, or mobile within the province. Two of the stations worked must be using a VO2 Labrador prefix.

WAVO VHF is available to amateurs who show proof of contact with twenty stations using a simplex mode of operation. Repeater operation is not permitted. All contacts must be later than June 1, 1946. No endorsements are available.

QSL cards are not needed as proof of contact. The log-book entries must be certified by an executive of a recognized club or two other amateur operators. The submitted list of log-book entries must include the call of the station worked, date, time, band, mode, signal report given to the VO station, and the signed report received from the VO station.

WAVO applications should be sent to: VO1FG Awards Chairman, PO Box 501, Carbonear, Newfoundland, Canada.

WORKED ATLANTIC PROVINCES AWARD

To qualify for this award, eleven VE1 amateurs must work eight different counties of Nova Scotia, eight different counties of New Brunswick, two different counties of Prince Edward Island, and five different counties of Newfoundland. All other stations must work four different counties of Nova Scotia, four different counties of New Brunswick, one station in Prince Edward Island and three different Newfoundland stations.

QSLs must be in the applicant's possession. To apply, send log data and 50 cents or 5 IRCs to: Walt Jones VE1AMR, 79 Waverley, Moncton, New Brunswick, Canada E1G 7T8.

WORKED ONTARIO COUNTIES AWARD

The Worked Ontario Counties contest is intended as an operating challenge to radio amateurs and to encourage the working of Ontario stations by those located beyond as well as within the province.

Two Worked Ontario Counties certificates are offered. The first, WOC-30, will be awarded to each operator submitting QSL cards representing thirty of the counties in Ontario. The second, WOC-50, will be awarded to an operator submitting an additional twenty cards representing an additional twenty counties. It is not necessary to obtain the WOC-30 before applying for the WOC-50.

The Province of Ontario consists of 54 counties and districts. The word county, as used in connection with the WOC contest,

REMOTE -O- MIKE

$34.95

FM Wireless Mike

- Range—up to 300 ft.
- FM Audio
- XTAL Controlled
- Simple Hook-up
- Reliable years of service

Stop: The steering wheel mike cord tangle. Stop: Running back and forth to answer a call on your radio. Stop: The inconvenience of being tied to your radio during long QSO's. The Remote-O-Mike may be connected to any HF, VHF or UHF ham transceiver. Just connect the Remote-O-Mike receiver to the mike input jack and each time you press the PTT button on your cordless mike your ham rig will function as your normal mike. The Remote-O-Mike receiver will provide both the PTT and audio to your ham rig.

Use in and around the house, auto, boat, etcetera. Just like a repeater with a range of up to 300 ft. Each Remote-O-Mike includes a XTAL controlled wireless FM mike and FM receiver. How do you spell mike cord tangle relief (Remote-O-Mike) Order today for your mike cord relief.

WORKS ON ANY RADIO—MOBIL OR BASE

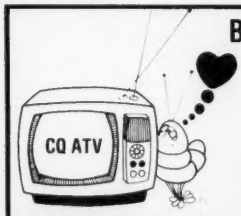
master charge VISA

To Order Call (714) 268-8131—Free Shipping

221

Discount Ham Radio 9520 Chesapeake Dr., #606 A, San Diego, CA 92123

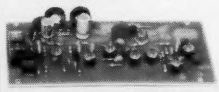
BITTEN BY THE ATV BUG?



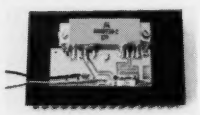
Let P.C. put you on the air and SAVE!

Complete System price

$249.00 SAVE $13.00

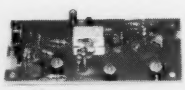


TXA5-4 Exciter/Modulator . . . . . $89.00 ppd.
Wired and tested module designed to drive PA5 10 watt linear amplifier. The 100 MHz crystal design keeps harmonics out of two meters for talk back. Video modulator is a full 8 MHz for computer graphics and color. Requires 13.8 VDC reg. @ 70 ma. 80 mw output power. Tuned with crystal on 439.25, 434 or 426.25 MHz.
Dual frequency model available . . . . . $115.00 ppd.



PA5 10 Watt ATV Power Amplifier . $89.00 ppd.
The PA5 will put out 10 watts RMS power on sync tips when driven with 80 mw by the TXA5 exciter. 50 ohms in and out plus bandwidth for the whole band with good linearity for color and sound. Requires 13.8 VDC reg. @ 3 amps.

FMA5 Audio Subcarrier Generator . $29.00 ppd.
Puts audio on your camera video just as broadcast does at 4.5 MHz. Puts out 1 V p-p to drive TXA5. Requires low Z mike, 150 to 600 Ω and 12 to 18 VDC @ 25 ma. Works with any transmitter with 5 MHz video bandwidth.



TVC-2 ATV Downconverter. $55.00
Stripline MRF 901 preamp and double balanced mixer digs out the weak ones and resists intermod and overload. Connects between UHF antenna and TV set. Output channels 2 or 3. Varicap tuner 420 to 450 MHz. Requires 12 to 18 VDC @ 20 ma.
Supersensitive TVC 2L with NE64535 preamp (.9 db N.F.) . . . . . $69.00 ppd.

Call or write for our complete catalog of specifications, station setup diagrams, and optional accessories which include: antennas, modulators, test generators, cameras and much, much more. See Ch. 14 1983 ARRL Handbook.

TERMS: VISA or MASTERCARD by telephone or mail, or check or money order by mail. All prices are delivered in USA. Allow three weeks after order for delivery.

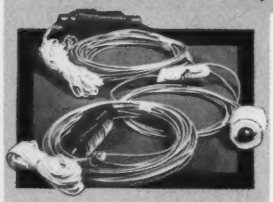
(213) 447-4565 Charge card orders only

P.C. ELECTRONICS 2522 Paxson Lane,
Tom W6ORG Maryann WB6YSS Arcadia, California 91006

---

new TUNABLE TRAP ANTENNA

Model AT-80 for 80, 40, 15, 10 meters



PRICE

$49.50

SHIPPING AND HANDLING ADD $3

- Length only 88 feet.
- New Patented Traps.
- Weatherproof.
- Traps and Antenna are continuous wire, no connections to fail.
- Install as an inverted V or flat top dipole.
- Antenna tuning is accomplished by sliding a wire through trap and along antenna wire.
- No wire trimming or soldering.
- Built in ¼ wave matching section, with weatherproof center insulator terminated with an SO-239 connector.
- Antenna completely assembled including 25 feet nylon guy rope on each end.
- Power capability 1 kw input.
- Low SWR at resonance.

ALL OUR PRODUCTS MADE IN USA

B·W **BARKER & WILLIAMSON**
Quality Communication Products Since 1932
At your Distributors, write or call:
10 Canal Street, Bristol, Pa. 19007
(215) 788-5581

11

will be understood to mean county and/or district.

For the purpose of these awards, Lennox and Addington (though politically merged into a single county) will be scored as two counties. The four townships in the southwest corner will be considered Lennox and the balance of the county Addington. The Lennox townships are Richmond, North Fredericksburgh, South Fredericksburgh, and Adolphustown. Napanee is in Lennox; Odessa, Camden East, and Cloyne are in Addington.

Also, Patricia will be considered to be all that part of Kenora situated along or north of the CNR main line from Cochrane to Winnipeg and will score as a separate county. Red Lake, Pickle Lake, and Sioux Lookout are eligible in Patricia.

Contacts must be made, using your own equipment, from the home location or from within twenty miles from the home location. Contacts made from outside the home county will not count for the operator of the mobile but may be scored by the other operator in the QSO as a contact for the county in which the mobile is located. Each QSL card must show the county in which the issuing station was located at the time of the QSO. Each station must work the other directly with no relaying of information by way of intermediate stations.

Contacts may be made on any band, and any mode or combination of modes may be used. Any contact made on or after January 1, 1957, may be included. There is no deadline unless otherwise announced at some time in the future.

All regulations enforced by the Department of Communications applying to amateur radio stations shall be observed by Canadian stations. Similarly, stations in other countries must observe the regulations of their respective governments.

Cards for judging should be mailed to the awards manager. Although the club will endeavor to return all cards safely, no responsibility can be assumed for cards which may be lost in transit. Sufficient postage must be included for the return of your cards by the method you specify.

In case of dispute on any matter relating to the WOC contest, the Executive Committee of the Metro Amateur Radio Club will decide the issue and their decision shall be final. Mail applications to: Awards Manager, Al Brown VE3AB, 360 Manor Road East, Toronto, Ontario, Canada M4S 1S2.

FRASER VALLEY DX CLUB AWARD

To apply for this distinctive award, Canadian and American stations must contact fifteen club members. DX stations contact five. All contacts must be after May 1, 1978.

To apply, typical log information is required. Canada and USA stations forward $1.00 with your log data and DX stations may send five IRCs. Mail them to: Fraser Valley DX Club Awards Manager, Howard Martin VE7AFY, 45-9960 Wilson Road, Ruskin, British Columbia, Canada V0M 1R0.

THE WINNIPEG DX CLUB AWARD

The award consists of a personalized presentation case containing a genuine new Canadian silver dollar issued by the Royal Canadian Mint.

Amateurs throughout the world are eligible but American and Canadian applicants must be members of the DXCC and must submit the number and date of the DXCC certificate. Amateurs in other countries of the world do not have to be DXCC holders in order to qualify for the award.

All contacts must be made after January 1, 1970. Thirty-one are necessary, representing five from each one of the continents of Africa, Asia, Europe, North America, South America, and Oceania; also necessary is one contact from any Antarctic station. The five contacts from each continent may be from different countries on that continent, but the five North American contacts must be with members of the Winnipeg DX Club. Members of the club include: VE4s: AA, AE, AH, AS, AT, BJ, CJ, EW, MP, RP, SA, SK, SL, SW, XJ, and SN.

QSLs for all contacts must be in the applicant's possession. To apply for this award, send certified log data and fifteen IRCs or $3.00 to: Sandy Wohl WE4SW, 33 Cherryhill Road, Winnipeg, Manitoba, Canada R2V 2L1.

SKI CANADA AWARD

Eric Walden VE3HLL advises us that he is award manager for the Ski Canada Award. To qualify for this certificate, all amateurs must work two stations from each of the major skiing provinces: British Columbia, Alberta, Ontario, and Quebec. A total of eight contacts is required. All contacts, to be valid, must be made on or after January 1, 1978. There are no band or mode limitations.

The major ski areas from each province are: for British Columbia: Vancouver, Vernon, Kamloops, Penticton, Kelown, Kimberley, Princeton, Revelstoke, Nelson, Prince George, and Port Alberni; for Quebec: Montreal, Quebec City, Saint Jerome, Saint Adele, Saint Jovite, and Sutton; for Ontario: Collingwood, Thunder Bay, Ottawa, London, Barrie, Kitchner-Waterloo, Huntsville, Orillia, Brace Bridge, Own Sound, Flesherton, Sault Saint Marie, and Meaford; for Alberta: Calgary, Edmonton, and Banff.

Applicants are asked to send all log data and $2.00 to: Eric Walden VE3HLL, Rural Route 1, Gowanstown, Ontario, Canada N0G 1Y0.

FRAMINGHAM AMATEUR RADIO ASSOCIATION

The Framingham Amateur Radio Association, Framingham, Massachusetts, will commemorate its 50th anniversary by awarding certificates throughout 1983 to any station contacting the club station, W1FY, or three club members.

Send a large SASE and log information to FARA, PO Box 3005, Framingham MA 01701.

W1FY will operate on Saturday mornings from 1400Z to 1600Z on phone, 14.280-14.290.

ALAMO VILLAGE DXPEDITION

Members of the Border Amateur Radio Society and the Uvalde Radio Club are offering an award to stations who work the clubs' annual Alamo Village DXpedition.

A handsome certificate depicting the main street of this replica of the famous Texas shrine will be sent to all stations that work the DXpedition and send an 8 × 10 SASE.

The Alamo Village station will be operating from 1800 UT April 16 to 1800 UT April 17 on the phone and CW portions of 40-10 meters.

SASEs should be sent to the Border Amateur Radio Society, PO Box CQ, Brackettville TX 78832.

READING RAILROAD 150th ANNIVERSARY

To celebrate the Reading Railroad 150th Anniversary, WB3AAL will operate on April 1, 2, and 3 from 1300Z until 2330Z, daily. Frequencies: 7.250, 14.300, and 21.375, plus or minus 5 kHz, starting on 7.250 at 1300Z and working on up in frequency every one and a half hours; Novice—21.150 daily from 1600Z until 1730Z. The first 150 contacts will receive a certificate; after that, contacts will receive a special QSL card celebrating this anniversary. To receive the certificate or QSL card, please send your QSL card with one US dollar to: Ronald J. Polityka WB3AAL, 1046 Weiser St., Reading PA 19601.

DX

Chod Harris VP2ML
Box 4881
Santa Rosa CA 95402

SUITLAND ISLAND —A NEW ONE?

In late September last year, a station signing KJ6DO/KH7S appeared on the bands, claiming to represent a new country. Almost 2000 amateurs fought their way through the pileups to work the station, in the hopes of catching this "new country." Within a few hours, however, the word was out: KJ6DO/KH7S was a pirate, a bootleg station, and contacts with the station had no DXCC value.

The Suitland saga had started earlier that month when the various DX bulletins received a letter purportedly from an amateur radio club on Johnston Island in the North Pacific. The letter included a copy of a map labeled Suitland Island, a thousand miles north of Hawaii. Also enclosed was a news release draft suggesting Suitland was a top-secret military base being returned to civilian control and a copy of a letter to Don Search W3AZD at ARRL headquarters, requesting separate-country status for the previously unknown island.

Fig. 1. DXers taken in by the Suitland hoax last fall will get this reminder of their eagerness from their QSL bureau.

Since one of the requirements for new-country status is a successful operation from the island, the radio club stated that they would be on the air from Suitland in a matter of weeks with the call KJ6DO/KH7S. All the DX bulletins dutifully shared the information with their readers.

On the announced day a station with that call did indeed come on the air and began working the pileups. As the operation continued, a few amateurs began to notice some strange facts. The KJ6DO/KH7S signal was weak and fluttery in California, as though the station were located on the West Coast and not the Pacific. W5 stations beat out the W6 stations to "Suitland"—not likely if the station were really in the North Pacific. Then Lee Wical KH6BZF took a careful beam heading on the station, using the sharp null on the side of the antenna pattern. The heading was 60°, or directly toward the States, and not north or northwest as the advertised location of Suitland would suggest.

These irregularities prompted listeners to ask questions about location, permission, etc. The KJ6DO/KH7S operator gave evasive replies. After a while, KH6BZF relayed the information that the Suitland operator was giving his QSL manager as H0AX. Eventually the station shut down, the fun over.

The Suitland hoax was not a typical pirate operation. Not many amateurs provide advance information on their hoaxes. Should the DX bulletins have been more skeptical about the letter? The letter to the DX bulletins with maps and background information looked, on the surface, to be legitimate. But a close examination of the information reveals numerous clues for the skeptical DXer. The mere fact that there is no public record of the island should have been warning enough; in these days of satellite photography and the Freedom of Information Act, anyone can obtain detailed maps of the area, including the ocean floor. Not only do such maps show no island in the area, but there also are no seamounts or undersea mountains. Did the US military forge every undersea map to hide their secret island? Unlikely!

The map contains other clues suggesting a hoax. The magnetic deviation on the compass rose puts the map on the east coast of the US. The park, cemetery, railroads, and churches are not typical of a top-secret military base. The airport runway is a mere 3000' long, totally inadequate for the stated purpose.

The letter announcing the "DXpedition" also might have aroused the suspicions of a careful observer. The group specifically requested *no* contributions and *no* SASEs

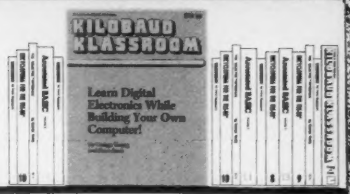
WAYNE GREEN BOOKS

KILOBAUD KLASSROOM

by George Young and Peter Stark

Makes learning electronics fun and easy. First published as a series in *Kilobaud Microcomputing*, the book combines the learning of essential theory with practical, hands-on experience. The course begins with basic electronic projects and culminates in the construction of your own programmable microcomputer. The direct instructional methods of authors Young & Stark make KILOBAUD KLASSROOM a simple way for you to acquire a solid background in digital electronics.

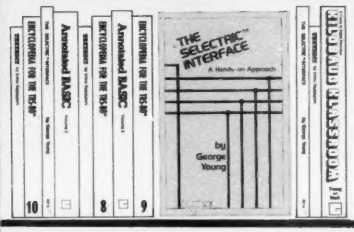
BK7386 (419 pages).....**$14.95**



THE SELECTRIC INTERFACE by George Young

You need the quality print that a daisy wheel printer provides but the thought of buying one makes your wallet wilt. The SELECTRIC™ INTERFACE, a step-by-step guide to interfacing an IBM Selectric I/O Writer to your microcomputer, will give you that quality at a fraction of the price. George Young, co-author of *Kilobaud Microcomputing* magazine's popular "Kilobaud Klassroom" series, offers a low-cost alternative to buying a daisy wheel printer. The SELECTRIC INTERFACE includes: step-by-step instructions, tips on purchasing a used Selectric, information on various Selectric models, including the 2740, 2980, and Dura 1041, driver software for Z80, 8080, and 6502 chips, tips on interfacing techniques. With The SELECTRIC INTERFACE and some background in electronics, you can have a high-quality, low-cost, letter-quality printer. Petals not included.

BK7388 (125 pages).....**$12.97**

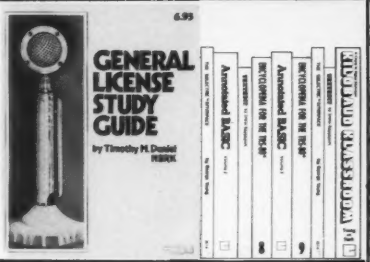


GENERAL LICENSE STUDY GUIDE

By Timothy M. Daniel N8RK

This is the complete guide to the General License. Learning rather than memorizing is the secret. This is not a question-and-answer guide that will gather dust when the FCC issues a new test. Instead, this book will be a helpful reference, useful long after a ham upgrades to General. Includes up-to-date FCC rules and an application form. Order yours today and talk to the world.

SG7358 (87 pages).....**$6.95**

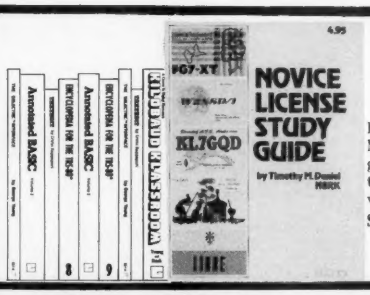


NOVICE LICENSE STUDY GUIDE

By Timothy M. Daniel N8RK

Here is the most up-to-date novice guide available. It is complete with information about learning Morse code, has the latest FCC amateur regulations and the current FCC application forms. This guide is *not* a question/answer memorization course but rather it emphasizes the practical side of getting a ham license and putting a station on the air. It reflects what the FCC expects a Novice to know without page after page of dull theory. The most current information still available at last year's price.

SG7357 (98 pages).....**$4.95**



THE NEW WEATHER SATELLITE HANDBOOK by Dr. Ralph E. Taggart WB8DQT

Here is the completely updated and revised edition of the best-selling *Weather Satellite Handbook*—containing all the information on the most sophisticated and effective spacecraft now in orbit. Dr. Taggart has written this book to serve both the experienced amateur satellite enthusiast and the newcomer. The book is an introduction to satellite watching, providing all the information required to construct a complete and highly effective ground station. Not just ideas, but solid hardware designs and all the instruction necessary to operate the equipment are included. For the thousands of experimenters who are operating stations, the book details all procedures necessary to modify their equipment for the new series of spacecraft. Amateur weather satellite activity represents a unique blend of interests encompassing electronics, meteorology and astronautics. Join the privileged few in watching the spectacle of earth as seen from space on your own monitoring equipment.

BK7383 (132 pages).....**$8.95**

FOR TOLL-FREE ORDERING CALL 1-800-258-5473
WAYNE GREEN BOOKS•PETERBOROUGH NH 03458

Itemize your order on a separate piece of paper and mail to Wayne Green Books, Att: Sales, Peterborough, NH 03458. Be sure to include check or detailed credit card information. (Visa, MC or AMEX accepted.) No C.O.D. orders accepted. All orders add $1.50 for the first book, postage and handling; $1.00 each additional book; $10.00 per book foreign air mail. Please allow 4–6 weeks after publication for delivery. Questions regarding your order? Please write to Customer Service at the above address.

Photo A. Martti Laine OH2BH (right) led a group of 60 hams to Aland Islands for the CQ WW contests.

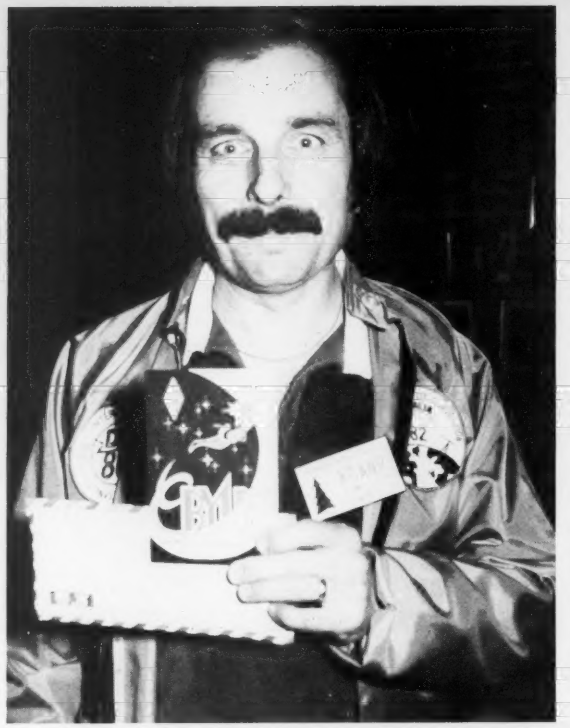


Photo B. "I can't believe I worked the real thing!" Redwood Empire DXer, Len Geraldi K6ANP, flashes his BY1 QSL, his first real QSL after five contacts with pirate BY1AAs.

with the QSLs. The QSL address was an APO box with no stateside manager. It would be hard to imagine a legitimate DX-pedition setting up such a strange QSL route.

But this analysis has been made with the benefit of hindsight. It does not surprise me that the bulletin editors were taken in by the documentation; so seldom do they get such good information far enough in advance to be useful that they eagerly published the data.

The Suitland hoax did not end with the last contact, as most such operations do. A couple of months after the operation, QSL cards (see Fig. 1) began to appear in bureau shipments. If you were among those hams who worked Suitland, keep an eye out for your card.

Suitland was not the only amateur radio hoax of 1982. Dozens of amateurs worked a station signing BY1AA (see this column, July, 1982) last year. Unfortunately, this station was *not* located in China. Bootleg BY1AA stations made far more contacts than did the real China reporter.

Any amateur working a station signing BY1AA would immediately shoot off a QSL card with an SASE and hope for the best. Most of these amateurs received a nice postcard in return, but no QSL card. The card says, "Sorry, your QSO not in log. You must have contacted a bootleg station. Better luck next time." And most of these hams honestly thought they worked BY1AA. A station signing that callsign acknowledged their call. Unfortunately for the stateside amateur, the station signing BY1AA was not the legitimate one, and the contact does not count for DXCC.

While bootleg BY1AA stations worked dozens of stations, some other unusual callsigns attracted considerable attention. Every April 1st, dozens of strange calls appear on the bands, and many attract sizable pileups. Long-time DXers have learned to ignore the CQ DX of such stations as APR1L, F0OL, and that famous Russian RG8U!

Such antics are by no means limited to April Fool's Day. Hardly a day passes without some bogus station making a handful of contacts, then quickly disappearing. Many of these stations sound legitimate and reasonable, often using names and QSL addresses of active DX-peditioners.

Your DX editor's callsign has been taken in vain by several phony operations. I was supposed to be in Macao, operating CR9, one week. Another bootleg operation using my call as QSL manager was a European station signing an HI9 call who worked dozens of fellow Europeans on 80 meters. Many of those European stations thought they had snagged a rare one on 80 meters, only to receive word that the operation was bootleg and the contacts valueless.

Why would otherwise skeptical amateurs line up to work RG8U? The answer is "Work 'em first; worry later!" Too many DXCC countries have appeared on the bands suddenly, without warning. Perhaps a well-traveled DXer in the country managed to talk a government official into permitting a short operation session. In any case, the stateside DXer might get only one chance at a contact before the rare station disappears again. Rather than waste valuable operating time discussing the legitimacy of the station, the stateside DXer jumps into the pileup with both feet to make a contact, just in case.

This attitude prevails especially among the DXers with 250 or more countries. These amateurs have worked almost every country with active amateurs. Now they must await a DXpedition, or reactivation of a long-quiet country. Small wonder that these operators jump at any new or different callsign, especially when the magic phrase "new one" is bandied about. Whenever a new country or even an unknown callsign appears on the band, those DXers striving for the Honor Roll feel they must "get in the log," on the chance that it might count for DXCC. This group of avid and undiscriminating DXers provides an inexhaustible pool of contacts for hoaxers and bootleggers.

The motivation on the other end, although I cannot condone it, is easier to understand. What amateur, after years of fighting DX pileups from the States, Europe, or Japan, wouldn't enjoy being on the receiving end of a pileup for a change? But this means going to a rare country, getting permission to operate, setting up a station, and then answering all those QSL cards. Too much work. It's so much easier just to use the rare callsign!

How can you recognize a bootleg operation? No infallible rules can separate legitimate contacts from bogus ones—one reason why there are so many bootleg operations. You have to look for a pattern of behavior to recognize the culprits. First, almost all bogus operations are conducted on CW. It is so much more difficult to ask penetrating questions on CW as opposed to phone, and those questions are easier to ignore on CW as well. Bootleg stations tend to omit such data as name, QTH, or operating schedule. A notorious bootlegger used the name "Slim," and that name has since come to mean any illegitimate operation, as in, "I think that BY is a Slim." Another possible clue is the QSL information. If a very rare station suggests QSLing via the bureau, you should beware. The QSL bureau is seldom the preferred means of exchanging cards, especially among the more impatient DXers. A station requesting cards *only* via the bureau might be pulling your leg.

Some hoaxes have been less than pleasant. Don Miller once claimed he operated from Maria Teresa reef in the Pacific. Satellite photographs eliminated any chance that an unknown island might still exist. This and other frauds eventually forced the ARRL to disallow DXCC credit for many of Don's claimed DXpeditions. A lawsuit against the League followed, but Don's word was discredited and one of the longest and most widespread DX hoaxes came to an end.

Fun it may be, but hoaxing is also illegal. FCC regulations specifically prohibit transmission of "false or deceptive signals." Also, using another callsign without proper permission is prohibited. The perpetrators of the hoax probably avoided mail fraud by specifically *discouraging* contributions and SASEs, but the federal government has a lousy sense of humor in these matters.

The reaction of the DX bulletins to being taken in by the Suitland hoax reflects the different attitudes of DXers toward such shenanigans. *The Long Island DX Bulletin* cried foul, mentioned a "full-scale federal investigation," and ended, "We're sure you agree that this sort of thing just *ain't funny*!"

On the other hand, *QRZ DX* called the hoax "a good afternoon of late summer's fun and excitement." The Texas-based newsletter even congratulated the perpetrators of the hoax, "who reminded us once again that this really is just a hobby and just for fun."

This writer tends toward the *QRZ DX* viewpoint. After all, DXing is only a game, and one shouldn't take the whole thing too seriously. But this does not suggest that amateur radio needs more such hoaxes. As long as the joke is done in the spirit of good fun and money stays out of it, a good hoax once in a while livens up the bands. But it would be very easy to have too much of this good thing. In short, a little fun goes a long way on the DX bands.

So the first time you discover you worked a pirate, don't be disappointed or discouraged. After all, you are in good company. Every DXer has worked Slim many dozens of times. If you find yourself on the list for RG8U, discover your BY1AA contact was a pirate, or find a black QSL with a skull and crossbones in your bureau shipment, remember that you're not alone.

HEARD ON THE LONG HAUL

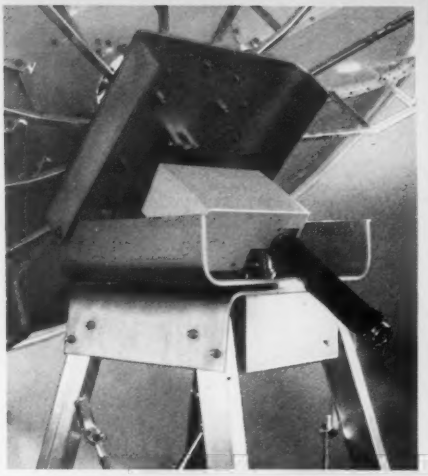
Tahiti—FO8 Ross Forbes WB6GFJ passes on word of the new address for the Tahiti QSL bureau. Send your FO8 cards to: Radio Club of French Polynesia, B. P. 5006, Pirae, Island of Tahiti, French Polynesia, South Pacific Ocean. Don't send cards for FO0 calls, as these are usually visitors to the islands and will not receive cards sent to Tahiti. Find a stateside manager or QSL address.

Philippines—DU Rick Todd N8CWX offers CW contacts from the Philippines. Drop him a line via PSC#2 Box 12956, APO San Francisco CA 96311. QSL via N2BCF.

Abu Ali—/A Lloyd and Iris Colvin (W6KG and W6QL) stopped at this small rock in the Red Sea long enough to make 4000 contacts, with the help of F0ECV and F6GBQ. QSL via Yasme, Box 2025, Castro Valley CA 94546.

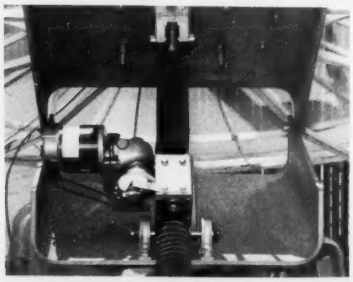
Aland Islands—OH0 Martti Laine OH2BH (see Photo A) and 60 other Finns put OH0W on the air for the CQ WW contests last fall. The group gave out 30,000 contacts from the islands, which lie between Sweden and Finland in the Baltic Sea. QSL your OH0W contacts via OH2BAZ, Patolantie 10A10, 00640 Helsinki 64, Finland.

AZ-EL MOUNT CLOSEOUT!



These massive commercial AZ-EL mounts were designed for KLM's 4 GHz satellite antenna systems. A contract cancellation now forces us to clear out the last 50 units at way below their original cost. These brutes will raise and rotate up to 450 lbs without a counterbalance (the equivalent of a commercial 10-12' dish) o just about any size moonbounce array you can think of. Look at all the features:

- Massive 1/2" steel construction
- Two reduction gearmotors
- Tubular steel legs / 1/2" rod braces
- Gold-Zinc plated
- Stainless steel hardware
- 360 AZ / 90 EL capable



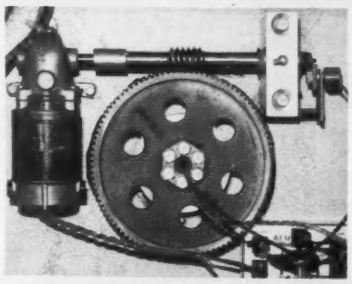
This is a powerful mount at an unbelievable price! Its first come, first served, so contact KLM now!

original price: $1995

Closeout Special!

$650

KLM electronics, Inc.
P.O. Box 816,
Morgan Hill, CA 95037
(408) 779-7363



SATELLITE TELEVISION RECEIVER KITS

Rainbow makes a top-of-the-line Receiver affordable

The Electronic Rainbow Receiver consists of a receiver with an external down-converter that mounts at the antenna, feeds the voltage to the LNA through the coax cable. The 4GHz signal is down converted to 70 MHz and is fed through the RG59/U coax to the receiver.

Rainbow Kits are supplied with simple step by step instructions. All the circuits that you need expensive test equipment to do are pre wired and tested. All printed circuit boards have the outline of each part printed on them.

RECEIVER FEATURES
Built in RF modulator • Detent Tuning-3.7 to 4.2 GHz • Variable Audio-5.5 to 7.5 MHz • Invert Video • Channel Scan • Voltage monitoring • Meter output • Remote Tuning

SPECIFICATIONS:
Single Conversion Image Rejection Downconverter • Threshold 8 db CNR • IF Bandwidth 24MHz • Output IV Audio and Video • IF Frequency 70MHz • Video Bandwidth 4.5MHz • Size 3½"Hx8½"Dx11¼"W

Complete Satellite TV Receiver

KIT #1 — Contains:
- Mainboard • Tuning Board • Down-converter Board • Modulator Board
- All parts needed to complete receiver
- Down Converter built in case.
- Cabinet, attractive black brushed anodized metal with silk screened front and back for a professional look
- 70 MH2 Filter is pre-wired and tested.
- Complete instruction Manual.

$395.00

KIT #2 — Board Kit Contains:
- Main Board • Tuning Board • Down-converter board • Modulator Board
- Parts List, assembly and alignment manual
- 4GHz local oscillator and 70MHz filter is pre-wired and tested.

$129.00

Instruction manual. Contains printed circuit board layouts, parts placement, and alignment instructions. **$25.00**

Ask about guaranteed to play

We will accept telephone orders for Visa & Mastercard
No C.O.D. Orders
TO ORDER CALL 317-291-7262
800-428-3500
Complete kit weighs 10 lbs. Please add sufficient postage
6254 LaPas Trail
Indianapolis, Indiana 46268

ELECTRONIC RAINBOW INC

231

W2NSD/1
NEVER SAY DIE
editorial by Wayne Green

from page 8

nese and you'll see the difference. Our ZL friend finds he has to glue decals back on, straighten screws, and in some cases respray the cabinets. Sloppy workmanship and iittle, if any, quality control.

The Japanese are almost fanatics when it comes to both workmanship and quality control. Indeed, I'd like at this time to ask what few American manufacturers there are left if they will take a pledge to see that their products are quality perfect. This means a final test of every unit and meticulous inspection. It also means after-sale support with information and replacement parts.

In order to help all of the firms in our ham industry, I'm asking readers, readers anywhere in the world, to let me know which firms you've found put out the best products and support them the best and which you've been disappointed in or have given you a hassle when you've had a problem. You can be sure that I'll pass the word along to the appropriate people in the firms involved. Those with strong recommendations will get a listing in my column.

EARPHONE JACKS

One of the conveniences starting to show up on car stereo radios is an earphone jack. Just in case you are not a stereo fan, let me explain that no loudspeaker system can be quite as good as a good earphone system for hearing sound. Oh, with some good speakers, high-power amplifiers, and so on, you can do a pretty good job...but it won't be better than phones.

I put in a pair of Ads speakers and an Ads amplifier in my 280Z and the sound was superb. Then I tried to duplicate the installation with the Jaguar and the sound came out terrible, despite an awesome investment. Someone swiped the 280Z speakers but forgot the matching amplifier (ha), so I wasn't able to duplicate exactly the winner I had in the 280Z. Woulds't that the radio in the Jaguar had stereo phone jacks.

Since one of the more serious problems with most amateur radio mobile installations is the crummy voice quality which results from low audio power, a cheap little speaker, and often the speaker not being aimed at the driver, what would it hurt to put in one or two phone jacks? Two, I recommend, so the passenger can be in on the conversation. It would be a lot easier to hear and the quality would be enormously better.

Yes, I know that there are some states where it is illegal to wear headphones in the car. The law doesn't make a lot of sense to me, but then there are a lot of laws which fit that category. Sure, I know that if you are listening to loud music with earphones you might not hear a car hooting at you, but if the radio is up to the usual rock and roll volume, you aren't going to hear anything either...and your hearing is probably well on the way to being ruined for life.

But instead of arguing the point, why not just come up with a solution which is better? Here it is: How about an outside mike to pick up loud traffic noises and override the music? Any of you who have Walkman stereo players know there is a little mike built in and an override switch in case you want to talk over the music. Well, with an outside mike and an electronic override switch, you'd get the car hoots better than you might if you had no earphones. The circuit is simple and would add little in expense to the radio...but a lot in value.

Just in case any car radio people are reading this, what is the matter with you turkeys? You finally, grudgingly, have given us FM in our car radios, but you're still behind. Many of the new Japanese cars are coming through with AM/FM/TV sound now...yep, an audio tuner for the television channels so you can at least hear the audio portion of shows. And many require not much more than that. Let's start seeing some three-band car radios with two earphone jacks.

One more thing. With the newest in earphones, no one is going to know you're using 'em in the car. These are tiny phones which are in a wad of soft foam plastic, but with no headband. You just stick the foam into your ear and it holds fine with the thin wires hanging down. These are the latest for the Walkman radios and also are used for the wrist-radios.

SEE YOU AT DAYTON?

The conditions under which I tried to talk last year were so frustrating that I didn't really want to do that again. It was hot and stuffy and the noise from adjacent sessions was so bad that it was almost impossible to talk. The Dayton people suggested a Friday talk, where there would be no nearby sessions, thus keeping the noise down. Well, I'll give it a try.

They always want to know ahead of time what my subject is going to be so that they can put it into the program. I unkindly point out to them that as far as I know, no one ever consults the program, during or after the Hamvention. But that doesn't stop the need for an answer.

I'll put it up to you. Presumably, a fair percentage of you will be coming to Dayton this year, so what would you like to hear about? Drop me a line and give me some ideas, if you will.

1. Packet radio. I can explain what this is, how it works, and why I see a big future for it in amateur radio. This is a computer-oriented communications system which can be made high-speed and error-free. It can work with a single channel repeater, thus taking up less spectrum space. This is an area where an enterprising experimenter could come up with a good commercial system which could then be manufactured and be quite profitable. Certainly, there is going to be a growing market for ham packet-radio equipment.

2. No code...if anyone really wants to hear about that any more. It's been about beaten to death...without any sign that the FCC is going to slow down in moving toward a no-code license. Is it possible that we might even see more interest and enthusiasm for the code if it were not dictated by the government? I can also give some hints on just how the FCC is going about getting rid of the code.

3. What is the future of emergency communications and what part will amateur radio play in it? Will our country be able to get prepared to provide dependable communications in time of nuclear war? What is the role of the new FCC Long-Range Planning Committee and what has happened to the many NIAC groups which we have had for years and which have recently been completely reorganized? Where does amateur radio fit into the picture?

4. How possible are the rumored plans for routine amateur communications via commercial satellites? How could this be organized and what commercial hay can be made from the needs for equipment?

5. What role do computers have now in amateur radio and where is this going? Are we headed toward ham communications which will be largely digital, with automatic error-free relaying of messages anywhere in the world? How practical is it to get in on computers and amateur radio right now?

6. Should amateur radio be considered a total failure and disbanded as an almost total waste of radio spectrum?

7. How can you use your ham skills to start a small business at home and build it up to where you are independent?

8. What are the prospects for getting amateur-radio clubs started in schools and thus getting amateur radio into a strong growth mode...with the possibility for providing our high-tech firms with enthusiastic technicians and engineers so that they can start competing with Japan? Or has America lost its high-tech lead forever?

9. Should anyone really care that ham licenses can now be gotten by people with absolutely no knowledge of code, theory, or rules via the Bash materials? We already have a code-free license, for that matter, so why the fuss about Morse code?

10. We try to make *73* reflect your interests...yet when we mail out letters to non-subscribers we often get only a few percent response. What, if anything, can be done to arouse the interest of the majority of licensed amateurs in *73*? Should we just capitulate and put out a rag-chewers magazine and forget editorials, computers, repeaters, slow-scan, RTTY, packet radio, and so on? Is the interest in small construction projects dead?

Well, there are some ideas. I can also hold forth at great length on the ways to get in there and make millions of dollars via some of the new small computers which are on the market...but I get the impression that hams in general prefer to remain poor, complain about subscription rates, go on social security, and not be really interested in getting rich. Pity, for through some of my magazines I've helped to make hundreds upon hundreds of new millionaires...and I probably could help do it for you, if you weren't so set on being poor. And with some of the opportunities in communications just ahead, the door is opening for enterprising hams to get some of the action.

Please do drop me a QSL card or a note and let me know what you'd prefer to hear at Dayton. Pick one subject, okay? This isn't going to be a speaking marathon like I pulled when I visited South Africa.

"KEEP IN TUNE WITH THE WORLD"

**TECHNICAL ASSISTANCE BY F.C.C. LICENSED TECHNICIANS USING THE FINEST TEST & ALIGNMENT EQUIPMENT AVAILABLE:

•repairs
•alignments
•modifications
•installation of custom circuits

**PRODUCTS AVAILABLE:

•QSK keying
•VOX
•Power supplies—[memory keep alive]

*All above circuits for solid state equipment manufactured by

PARSEC COMMUNICATIONS
12325 Madonna Dr. Lansing, Michigan 48917
(517) 627-2650 or 627-2879
(6-10 PM EST)
VISA

159

AZDEN
PCS-4000
ADVANCED MICROCOMPUTER CONTROL - 10 MEMORIES - 25 WATTS - SUPER COMPACT 143-150 MHZ - ANY SPLITS - ONE-YEAR WARRANTY -
ALSO: PCS-300 HT, PCS-2800 10M FM, accessories, etc.

KDK
FM-2030
EASY TO OPERATE - SINGLE-KNOB TUNING - RIT - 10 MEMORIES - 25 WATTS - SCAN BAND OR MEMORIES - TT MIC. WITH UP/DOWN FREQ. CONT. - ANY SPLITS BEEPS AT MEMORY BAND LIMITS FOR EYES-OFF OPERATION

Special discounts - call for quote
B. G. CARL ELECTRONICS
11128 Claire Ave. Northridge, CA 91326
469
Call: 1-213-363-1216 (anytime) Bryan AG6R

Subscription Problem?

73 Magazine does not keep subscription records on the premises, therefore calling us only adds time and doesn't solve the problem.

Please send a description of the problem and your most recent address label to:

73 Magazine
Subscription Dept.
PO Box 931
Farmingdale, NY 11737

Thank you and enjoy your subscription.

BUY! SELL! TRADE!
COMPUTER & HAM EQUIPMENT
COMPUTER TRADER
ANNUAL SUBSCRIPTION
$10.00
Low Ad Rates — Mailed Monthly
Foreign Subscriptions - $25.00 Year
FREE 50 Word Classified Ad with Subscription Order
COMPUTER TRADER®
Chet Lambert, W4WDR
1704 Sam Drive • Birmingham, AL 35235
(205) 854-0271
Please include your Name, Address, Call Sign or Phone Number

Engraved Desk Plaque With Stand

NIAZQ

Black 2"x8" Plaque with white 3/4" high letters on silver metal stand.

$10.00 postpaid

METREX Associates
4 Huron Drive
Framingham, MA 01701
239

Custom Mailing Lists on Labels!
Amateur Radio Operator NAMES
Custom lists compiled to your specifications —**Geographic by ZIP** and/or **State; by Age** or **Birthdate;** by **Licence Issue** or **Expiration Date**—on labels of your choice.
Total List: 411,000 Price: $25/Thousand
Call **203: 438-3433** for more information
Buckmaster Publishing 226
70 Florida Hill Rd., Ridgefield, CT 06877

this publication is available in microform

University Microfilms International

300 North Zeeb Road
Dept. P.R.
Ann Arbor, MI 48106
U.S.A.

18 Bedford Row
Dept. P.R.
London, WC1R 4EJ
England

CB TO TEN METER CONVERSION KITS

10 METER FM—Limiter discriminator board with specific instructions to fit over 80 different AM & SSB chassis

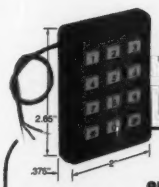
SSB-AM KITS—Now in stock kits for most CB models—23 or 40 channels

NEW & USED—FM—SSB—AM converted C.B.'s in stock

ANEXTER MARK ANTENNAS—You saw them at Dayton. Now in stock the HW-3 three band helewhip that covers 10—15—20 meters with no traps

FREE CATALOG—Write or call today

INDEPENDENT CRYSTAL SUPPLY COMPANY
141 Rt. 6A, Box 183
Sandwich, Ma. 02563-0183
(617) 888-4302
78



THE PROFESSIONAL TOUCH TONE ENCODER

An ultra high quality encoder for professional application. Absolute reliability and function makes the difference. There's a Pipo encoder for every system and application. Totally serviceable, easy to operate and install. *Call or write for free catalog and information!* (213) 852-1515 or P.O. Box 3435, Hollywood, CA 90028.

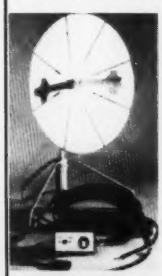
PATENTED • AT&T

Pipo Communications
Emphasis is on Quality & Reliability 300

RELIABLE MICROWAVE TV ANTENNAS

2.1 to 2.6 GHz Frequency Range
34db System Gain (or Greater)

Complete System (as pictured)	$119.95
Down Converter Probe Style (Assembled and Tested)	$ 49.95
Power Supply (12V to 16V DC+) (Assembled and Tested)	$ 39.95



PETERSON ELECTRONICS
4558 Auburn Blvd.
Sacramento, CA 95841
(916) 486-9071
182

C.O.D.'s
SPECIAL QUANTITY PRICING
Dealers Wanted

1 YEAR WARRANTY PARTS & LABOR

MasterCard VISA

PRESERVE 73 MAGAZINE BINDERS & FILE CASES

Keep your issues of 73 Magazine together, handy and protected in handsome and durable library files or binders. Both styles bound in red leatherette with the magazine logo stamped in gold.

Files: Each file holds 12 issues, spines visible for easy reference, $5.95 each, 3 for $17.00, 6 for $30.00

Binders: Each binder holds 12 issues and opens flat for easy reading, $7.50 each, 3 for $21.75, 6 for $42.00

(Postage paid in USA. Foreign orders include $2.50 per item)

Please state years: 1977 to 1983

Send check or money order to:
JESSE JONES BOX CORP.
P.O. Box 5120
Philadelphia, PA 19141

Allow 4 to 6 weeks for delivery

SYNTHESIZED SIGNAL GENERATOR

MADE IN USA

MODEL SG100D
$349.95
plus shipping

• Covers 100 to 185 MHz in 1 kHz steps with thumbwheel dial • Accuracy 1 part per 10 million at all frequencies • Internal FM adjustable from 0 to 100 kHz at a 1 kHz rate • Spurs and noise at least 60 dB below carrier • RF output adjustable from 5-500 mV at 50 ohms • Operates on 12 Vdc @ 1/2 Amp • Available for immediate delivery • $349.95 plus shipping • Add-on Accessories available to extend freq. range, add infinite resolution, voice and sub-audible tones, AM, precision 120 dB calibrated attenuator • Call for details • Dealers wanted worldwide.

VANGUARD LABS 311
196-23 Jamaica Ave., Hollis, NY 11423
Phone: (212) 468-2720

See List of Advertisers on page 114

THE SELECTRIC™ INTERFACE

Daisy wheel quality without daisy wheel expense.

You need the quality print that a daisy wheel printer provides but the thought of buying one makes your wallet wilt. *The Selectric™ Interface*, a step-by-step guide to interfacing an IBM Selectric I/O Writer to your microcomputer, will give you that quality at a fraction of the price. George Young, co-author of *Microcomputing* magazine's popular "Kilobaud Klassroom" series, offers a low-cost alternative to buying a daisy wheel printer.

The Selectric™ Interface includes:

- step-by-step instructions
- tips on purchasing a used Selectric™
- information on various Selectric™ models, including the 2740, 2980, and Dura 1041
- driver software for Z80, 8080, and 6502 chips
- tips on interfacing techniques

With *The Selectric Interface* and some background in electronics, you can have a high-quality, low-cost, letter-quality printer. Petals not included.

Credit card orders call TOLL-FREE 1-800-258-5473. Or mail your order with payment plus $1.50 shipping and handling to: Wayne Green Inc. Attn: Retail Book Sales, Peterborough, NH 03458.

Dealer inquiries invited.

ISBN 0-88006-051-4 128 pages **$12.97**

☐ Yes, I want **Selectric Interface** (BK7388). Enclosed is $12.97 per copy plus $1.50 for shipping and handling.

☐ MASTER ☐ VISA ☐ AMEX

Card # _____ Expires _____

Signature _____

Name _____

Address _____

City _____

State and Zip _____

All orders shipped UPS if complete street address is given.

334B6S

Make A Name For Yourself In Technical Publishing.

Wayne Green Books announces a June 1, 1983 deadline for submitting manuscript proposals for the upcoming publication list. Ideas for book-length manuscripts about any microcomputer system or area of electronics will be considered. In addition to payment and royalties, we offer our distribution channels and the marketing support your book deserves.

Send proposals or requests for a copy of our Writer's Guide to: Editor, Wayne Green Books, Peterborough, NH 03458. Or call toll-free 1-800-258-5473.

MAKE IT EASY TO SAVE your copies of 73 Magazine

Your magazine library is your prime reference source—keep it handy and keep it neat with these strong library shelf boxes. They are made of white corrugated cardboard and are dust resistant. Use them to keep *all* your magazines orderly yet available for constant reference.

Self-sticking labels are available for the following:

80 Micro	*73 Magazine*	*Radio Electronics*
Microcomputing	*QST*	*Personal Computing*
inCider	*CQ*	*Byte*
Desktop Computing	*Ham Radio*	*Interface Age*

One box (BX1000) is $2.00, 2–7 boxes (BX1001) are $1.50 each, and 8 or more boxes (BX1002) are $1.25 each. Be sure to specify which labels we should send.

Call **TOLL-FREE** for credit card orders:

1-800-258-5473

Or use the order form in this magazine and mail to:

73 Magazine

Attn: Book Sales, Peterborough, NH 03458

☐ SHIPPING AND HANDLING CHARGES $2.00 per order ☐

THE BEST PLACE To Look For New & Used Equipment Buy-Sell-Trade *Our 4th Year*

NUTS & VOLTS MAGAZINE

PO BOX 1111-G • PLACENTIA, CA 92670
(714) 632-7721 ↙137

JOIN THOUSANDS OF READERS NATIONWIDE, EVERY MONTH

U.S.A. SUBSCRIPTIONS
$ 7.00 - 1 YR. 3RD CLASS MAIL
$12.50 - 1 YR. 1ST CLASS MAIL
$25.00 - LIFETIME - 3RD CLASS

VISA With Free Classified Ad MasterCard

WANTED

HIGHEST PRICES PAID FOR:

HARRIS RF-301
&
ASSOCIATED EQUIPMENT

CALL COLLECT:

LIBERTY ELECTRONICS, INC.

(212) 925-6048

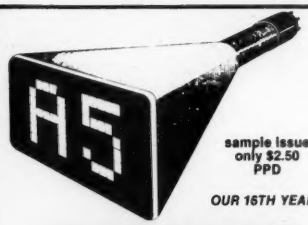
M/C Visa
$129.95

NEW! HF WATTMETER

- Digital Resolution (0.1 or 1 Watt)
- Wideband (160 through 10 meters)
- Wide range (QRP to 1999 Watts)
- Detachable (RF Sampler un-plugs)
- Battery Saver turns off minutes after RF disappears
- Price includes—Readout, HF Sampler, battery, VSWR nomogram and complete schematics.
- 90 day warranty

↙219

write or call:
e-tek P.O. Box 625, Marietta, OH 45750
1-(614)-374-2280



sample issue only $2.50 PPD

OUR 16TH YEAR!

AMATEUR TELEVISION MAGAZINE ↙115

FOR THE SPECIALIZED COMMUNICATION RADIO AMATEUR™

	Surface U.S./Canada Mexico	Surface All Foreign	Airmail Central S. America	Airmail All Other Foreign
½ year	$ 10.00	$ 13.00	$ 20.00	$ 23.00
1 year	$ 20.00	$ 26.00	$ 40.00	$ 46.00
2 year	$ 38.00	$ 50.00	$ 78.00	$ 90.00
3 year	$ 56.00	$ 74.00	$116.00	$134.00

ATV-SSTV-FAX-RTTY-Satellites-EME Microwave and Computers.

Published 12 times per year by Mike Stone WB0QCD
P.O. Box H, Lowden, Iowa 52255 0408

FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE! FREE!

SEND FOR OUR NEW 1983 PARTS CATALOG

THOUSANDS OF SURPLUS ELECTRONIC PARTS, SUPPLIES AND DEVICES.

ALL ELECTRONICS CORP
905 S. Vermont Ave.
P.O. Box 20406
Los Angeles, Cal. 90006
↙20

YAESU FT-207R OWNERS

AUTO SCAN MODULE AND BATTERY SAVER KIT

WRITE FOR CLUB DISCOUNTS

15 minutes to install; scan restarts when carrier drops off; busy switch controls automatic scan on-off; includes module and instructions.

Model AS-1. $25.00

new

FT-207R BATTERY SAVER KIT MODEL BS-1 $14.95

- *No more dead batteries due to memory back-up
- *30% less power drain when squelched
- *Simple to install; step-by-step instructions and parts included
- *4 mA memory backup reduced to 500 μA.
- *45 mA receiver drain reduced to 30 mA.
- *Improved audio fidelity and loudness

ENGINEERING CONSULTING ↙400
P.O. Box 216
BREA, CALIFORNIA 92621

AMATEUR RADIO SOFTWARE FOR VIC AND 64

THE DIPOLE ANTENNA & ANTENNA FORMULAS.....$8.95
THREE ELEMENT YAGI & ANTENNA FORMULAS.....$8.95
•BASIC & MORE ELECTRONIC FORMULAS.....$8.95

MORSE CODE TUTOR.....$8.95
GIVES YOU PRACTICE AND TESTS YOU FROM 5-20 WPM, WITH TOTALLY RANDOM FIVE CHARACTER CODE GROUPS.

AMATEUR RADIO DATA SYSTEM.....$14.95
RECORD CALLSIGN, NAME, CITY, STATE, CONTACT #, DATE, TIME, FREQ. ON EACH CONTACT. 50 CONTACTS PER FILE, UNLIMITED NUMBER OF FILES. REQUIRES A MINIMUM OF 3K ADDITIONAL MEMORY.

•MULTI-FILE.....$24.95
SIMILAR TO ABOVE PROGRAM, BUT 8 UNTITLED LINES ALLOW ANY TYPE FILE TO BE PROCESSED. 100 ITEMS PER FILE MAY BE STORED WITH ADEQUATE MEMORY AND ALLOWS USE OF CASSETTE, DISK AND PRINTER.

• INDICATES PROGRAM NOW AVAILABLE IN 64 VERSION.

ALL PROGRAMS AVAILABLE ON DISK—ADD $3.00
VIRGINIA RESIDENTS ADD 4%. WE PAY POSTAGE.
SEND CASH, CHECK OR MONEY ORDER TO:

RUSS SOFTWARE LTD.
P.O. BOX 370 NORTHWEST STATION
CHESAPEAKE, VA. 23322 ↙207
(804) 421-3914

GO MOBILE WITH YOUR H.T.!

Model I—Icom IC-2A/T, Etc.
Model K-1 for TR-2500
—slides on bottom of radio

Guaranteed!

Model K—TR-2400;
—powered thru battery plug
Model N—FT-208R
Model T—Simple mod for Tempo

SEE US AT THE DAYTON HAMVENTION!

Model Y—FT-207R,
—fits into battery compartment

A unique battery eliminator HANDI-TEK Regulator allows constant hand-held operation from auto DC or base supply with no nicad drain and WITHOUT RADIO MODIFICATION! $24.95 PPD in USA. CA add $1.50 Sales Tax.
↙460

HANDI-TEK
P.O. BOX 2205, LA PUENTE, CA 91746

Check These Prices On Factory Prime Parts
★ AUTHORIZED MAIL ORDER DISTRIBUTORS
★ MOTOROLA MRO DISTRIBUTOR
★ DON'T SEE IT?? GIVE US A CALL!!

POPULAR MICROWAVE DEVICES —

MRF 901	$2.15	MRF 911	$2.15
2N6603 (replaces MRF 902)	$9.75	NEC 02135 high gain/low noise	
MBD 101	$ .45		$3.50

LINEAR IC'S —

MC 1330A1P	$1.75	MC 1350P	$1.20
MC 1349P	$1.40	MC 1358P	$1.70
MC 1374P	$2.40	MC 1496P	$1.00
NE 565	$1.30	MC 1458CP1	$ .70
NE 564	$3.95	MC 4558CP1	$ .85

LOW PROFILE SOLDER TYPE IC SOCKETS —
8 pin to 40 pin 1¢ per pin (20 pin = 20¢)

MISCELLANEOUS —
POLARIZED LINE CORD - 5 FT $ .42
75 - 300 OHM MATCHING TRANSFORMER $ .50

MasterCard VISA COD'S

KCS Electronics Corp.
P.O. Box 33205
Phoenix, Arizona 85067
(602) 274-2885 ↙230

Special Quantity Pricing. Min. Credit Card Order $15.00. No Min. on COD or Prepaid. Prepaid Orders Add $2.50 Ship., Ins., Handling

↙See List of Advertisers on page 114

MAKE SAVING MONEY A WAY OF LIFE

With **LIVING ON A SHOESTRING:** A Scrounge Manual for the Hobbyist. Almost anything you find can be put to good use if you follow the techniques of a master scrounger. George Ewing shows you how to:

- Find electronic parts
- Locate tools and other surplus
- Scrounge by the rules
- Read up on scrounging
- Scrounge a vehicle
- Scrounge a place to live

Cartoons and case histories of scroungers add a humorous touch. With **LIVING ON A SHOESTRING**, you can't always get something for nothing, but you can certainly get it for less. $7.97 Softcover, 7×9, 128 pp. approx., ISBN 0-88006-059-X

Call TOLL FREE 1-800-258-5473 for credit card orders. Or mail your order with payment or complete credit card information. Include $1.50 for shipping and handling. Send to:

Wayne Green Inc.
Attn: Book Sales
Peterborough, NH 03458

A Wayne Green Publication — Dealer Inquiries Invited

YES, I want to scrounge! 334B6L

Send me ____ copies of **LIVING ON A SHOESTRING**. Enclosed is $7.97 (BK7393) per copy plus $1.50 shipping and handling.

☐ MASTERCARD bank # _____ ☐ VISA ☐ AMEX

Card # _____ Expires _____

Signature _____

Name _____

Address _____

City _____ State and Zip _____

MOVING?

Let us know 8 weeks in advance so that you won't miss a single issue of 73 Magazine.
Attach old label where indicated and print new address in space provided. Also include your mailing label whenever you write concerning your subscription. It helps us serve you promptly. Write to:

73 magazine
Subscription Department
P.O. Box 931
Farmingdale NY 11737

☐ **Extend my subscription one additional year for only $19.97**
☐ **Payment enclosed** ☐ **Bill me**

Canada and Mexico $22.97, US funds, Foreign Surface $39.97; US funds, drawn on US banks, Foreign Airmail, please inquire.

If you have no label handy, print OLD address here.

AFFIX LABEL

Name _____

Address _____

City _____ **State** _____ **Zip** _____

print NEW address here:

Name _____

Address _____

City _____ **State** _____ **Zip** _____

Dealers SELL

Selling *73 Magazine* will make money for you. Consider the facts:

Fact #1: Selling *73 Magazine* increases store traffic—our dealers tell us that *73 Magazine* is the hottest-selling amateur radio magazine on the newsstands.

Fact #2: There is a direct correlation between store traffic and sales—increase the number of people coming through your door and you'll increase sales.

Fact #3: Fact #1 + Fact #2 = INCREASED ALE, which means more money for you. And that's a fact.

For information on selling *73 Magazine*, call 800-343-0728 and speak with Ginnie Boudrieau, our bulk sales manager. Or write to her at *73 Magazine*, 80 Pine St., Peterborough, NH 03458.

73 MAGAZINE
80 Pine Street Peterborough, NH 03458
800-343-0728

RAMSEY ELECTRONIC'S Inc.

PARTS WAREHOUSE

We now have available a bunch of goodies too good to bypass. Items are limited so order today.

2575 Baird Rd.
Penfield, NY 14526
716-586-3950

Call your Phone Order in Today, TERMS: Satisfaction guaranteed or money refunded. C.O.D. add $2.50. Minimum order $6.00. Orders under $10.00 add $1.50. Add 6% for postage, insurance, handling. Overseas add 15%. N.Y. residents add 7% tax.

MINI KITS - YOU HAVE SEEN THESE BEFORE NOW HERE ARE OLD FAVORITE AND NEW ONES TOO. GREAT FOR THAT AFTERNOON HOBBY.

FM MINI MIKE

A super high performance FM wireless mike kit! Transmits a stable signal up to 300 yards with exceptional audio quality by means of its built in electret mike. Kit includes case, mike, on-off switch, antenna, battery and super instructions. This is the finest unit available.

FM-3 Kit **$14.95**
FM-3 Wired and Tested **19.95**

Color Organ

See music come alive! 3 different lights flicker with music. One light each for, high, mid-range and lows. Each individually adjustable and drives up to 300 W. runs on 110 VAC.

Complete kit, ML-1 **$8.95**

Video Modulator Kit

Converts any TV to video monitor. Super stable, tunable over ch. 4-6. Runs on 5-15V, accepts std video signal. Best unit on the market! Complete kit, VD-1 **$7.95**

Led Blinky Kit

A great attention getter which alternately flashes 2 jumbo LEDs. Use for name badges, buttons, warning panel lights, anything! Runs on 3 to 15 volts. Complete kit, BL-1 **$2.95**

Super Sleuth

A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2 W rms output, runs on 6 to 15 volts, uses 8-45 ohm speaker. Complete kit, BN-9 **$5.95**

CPO-1

Runs on 3-12 Vdc 1 wall out, 1 KHZ good for CPO, Alarm, Audio Oscillator. Complete kit **$2.95**

FM Wireless Mike Kit

Transmits up to 300' to any FM broadcast radio, uses any type of mike. Runs on 3 to 9V. Type FM-2 has added sensitive mike preamp stage.

FM-1 kit **$3.95** FM-2 kit **$4.95**

Whisper Light Kit

An interesting kit, small mike picks up sounds and converts them to light. The louder the sound, the brighter the light. Includes mike, controls up to 300 W, runs on 110 VAC. Complete kit, WL-1 **$6.95**

Tone Decoder

A complete tone decoder on a single PC board. Features: 400-5000 Hz adjustable range via 20 turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts. Complete kit, TD-1 **$5.95**

Universal Timer Kit

Provides the basic parts and PC board required to provide a source of precision timing and pulse generation. Uses 555 timer IC and includes a range of parts for most timing needs.

UT-5 Kit **$5.95**

Mad Blaster Kit

Produces LOUD ear shattering and attention getting siren like sound. Can supply up to 15 watts of obnoxious audio. Runs on 6-15 VDC.

MB-1 Kit **$4.95**

Siren Kit

Produces upward and downward wail characteristic of a police siren. 5 W peak audio output, runs on 3-15 volts, uses 3-45 ohm speaker. Complete kit, SM-3 **$2.95**

60 Hz Time Base

Runs on 5-15 VDC. Low current (2 5ma). 1 min month accuracy. TB-7 Kit **$5.50**
TB-7 Assy **$9.95**

CLOCK KITS

Your old favorites are here again. Over 7,000 Sold to Date. Be one of the gang and order yours today!

Try your hand at building the finest looking clock on the market. Its satin finish anodized aluminum case looks great anywhere, while six .4" LED digits provide a highly readable display. This is a complete kit, no extras needed, and it only takes 1-2 hours to assemble. Your choice of case colors: silver, gold, black (specify).

Clock kit, 12/24 hour, DC-5 **$24.95**
Clock with 10 min. ID timer, 12/24 hour, DC-10 **$29.95**
Alarm clock, 12 hour only, DC-8 **$29.95**
12V DC car clock, DC-7 **$29.95**

For wired and tested clocks add $10.00 to kit price.
SPECIFY 12 OR 24 HOUR FORMAT

SATELLITE TV KIT

THE POPULAR SAT-TEC RECEIVER IN KIT-FORM!

image rejection, fully tunable audio to recover 'hidden' subcarriers, divide by two PLL demodulator for excellent threshold performance, tight tracking AFC to assure drift free reception, and of course, full 24 channel tunable coverage.

Build your satellite TV system around the R2B, close to ten thousand others already have and now it's available in kit form at a new low price. Order yours today.

Featured in a Radio Electronics magazine cover story (May 82), the reliable R2B Sat-tec TV receiver is now operating in thousands of locations. The R2B is easy to build; pre-etched, plated boards with screened component layout assures accurate component placement and the critical IF section and local oscillator are pre-assembled and aligned! All parts are included for the R2B; attractive case, power supply, descriptive operating manual as well as complete assembly instructions. Features of the receiver include; dual conversion design for best

A complete Satellite TV System requires a dish antenna, LNA (low noise amplifier), Receiver and Modulator.

R2B Receiver Kit **$359.00**
R2B Receiver, Wired and Tested **$595.00**
120° K Avantek LNA **$485.00**
RM3 RF Modulator **$49.95**
Prices include domestic UPS shipping and insurance.

PARTS PARADE

IC SPECIALS

LINEAR

301	$ .35
324	$1.50
380	$1.50
555	$ .45
556	$1.00
565	$1.00
566	$1.00
567	$1.25
741	10/$2.00
1458	$ .50
3900	$ .50
3914	$2.95
8038	$2.95

TTL

74S00	$ .40
7447	$ .65
7475	$ .50
7490	$ .50
74196	$1.35

SPECIAL

11C90	$15.00
10116	$ 1.25
7208	$17.50
7207A	$ 5.50
7216D	$21.00
7107C	$12.50
5314	$ 2.95
5375AB/G	$ 2.95
7001	$ 6.50

CMOS

4011	.50
4013	.50
4046	$1.85
4049	.50
4059	$9.00
4511	$2.00
4518	$1.35
5639	$1.75

FERRITE BEADS

With info and specs **15/$1.00**
6 Hole Balun Beads **5/$1.00**

READOUTS

FND 359 .4" C C	$1.00
FND 507/510 .5" C A	1.00
MAN 72/HP7730 .33" C A	1.00
HP 7651 .43" C A	2.00

TRANSISTORS

2N3904 NPN C+F	15/$1.00
2N3906 PNP C+F	15/$1.00
2N4403 PNP C+F	15/$1.00
2N4410 NPN C+F	15/$1.00
2N4916 FET C+F	4/$1.00
2N5401 PNP C+F	5/$1.00
2N6028 C+F	4/$1.00
2N3771 NPN Silicon	$1.50
2N5179 UHF NPN	3/$2.00
Power Tab NPN 40W	3/$1.00
Power Tab PNP 40W	3/1.00
MPF 102/2N5484	$.50
NPN 3904 Type T+R	50/$2.50
PNP 3906 Type T+R	50/$2.50
2N3055	$.80
2N2646 UJT	3/$2.00

Resistor Ass't

Assortment of Popular values - ¼ watt. Cut lead for PC mounting, ½" center, ½" leads, bag of 300 or more. **$1.50**

Switches

Mini toggle SPDT **$1.00**
Red Pushbuttons N.O. **3/$1.00**

Earphones

3" leads, 8 ohm, good for small tone speakers, alarm clocks, etc. 5 for $1.00

Mini 8 ohm Speaker

Approx. 2¼" diam. Round type for radios, mike etc. **3 for $2.00**

Slug Tuned Coils

Small 3/16" Hex Slugs turned coil. 3 turns. 10 for $1.00

Sockets

8 Pin	10/$2.00
14 Pin	10/$2.00
16 Pin	10/$2.00
24 Pin	4/$2.00
28 Pin	4/$2.00
40 Pin	3/$2.00

Diodes

5.1 V Zener	20/$1.00
1N914 Type	50/$1.00
1KV 2Amp	8/$1.00
100V 1Amp	15/$1.00

25 AMP 100V Bridge **$1.50 each**

Mini-Bridge 50V 1 AMP 2 for $1.00

Crystals

3.579545 MHZ	$1.50
10.00000 MHZ	$5.00
5.248800 MHZ	$5.00

AC Adapters

Good for clocks, nicad chargers, all 110 VAC plug one end.

8.5 vdc @ 20 mA	$1.00
16 vac @ 160mA	$2.50
12 vac @ 250mA	$3.00

Solid State Buzzers

small buzzer 450 Hz .86 dB. sound output on 5-12 vdc at 10-30 mA. TTL compatible **$1.50**

AC Outlet

Panel Mount with Leads **4/$1.00**

CAPACITORS

TANTALUM Dipped Epoxy	ALUMINUM Electrolytic	DISK CERAMIC
1.5 uF 25V 3/$1.00	1000 uF 16V Radial $.50	01 16V disk 20/$1.00
1.8 uF 25V 3/$1.00	500 uF 20V Axial $.50	1 16V 15/$1.00
.22 uF 25V 3/$1.00	150 uF 16V Axial 5/$1.00	001 16V 20/$1.00
	10 uF 15V Radial 10/$1.00	100 pF 20/$1.00
		047 16V 20/$1.00

DC-DC Converter

+5 vdc input prod. -9 vdc @ 30ma
+9 vdc produces -15 vdc @ 35ma **$1.25**

Ceramic IF Filters

Mini[illegible] kHz
B.W [illegible] **SOLD OUT** $1.50 ea.

25K 20 Turn Trim Pot $1.00
1K 20 Turn Trim Pot $.50

Trimmer Caps

Sprague - 3-40 pf Stable Polypropylene .50 ea.

Crystal Microphone

Small 1" diameter ¼" thick crystal mike cartridge **$.75**

Mini RG-174 Coax

10 ft. for $1.00

Coax Connector

Chassis mount BNC type **$1.00**

9 Volt Battery Clips

Nice quality clips **5 for $1.00**
⅜" Rubber Grommets **10 for $1.00**

Parts Bag

Asst. of chokes, disc caps, tant. resistors, transistors, diodes, MICA caps etc. sm. bag (100 pc) **$1.00** lg. bag (300 pc) **$2.50**

Connectors

6 pin type gold contacts for mA-1003 car clock module price **.75 ea.**

Leds - your choice, please specify

Mini Red, Jumbo Red, High Intensity Red, Illuminator Red **8/$1**
Mini Yellow, Jumbo Yellow, Jumbo Green **6/$1**

Varactors

Motorola MV 2209 30 PF Nominal cap 20-80 PF - Tunable range - **.50 each or 3/$1.00**

Audio Prescaler

Make high resolution audio measurements, great for musical instrument tuning, PL tones, etc. Multiplies audio UP in frequency, selectable x10 or x100, gives .01 HZ resolution with 1 sec. gate time! High sensitivity of 25 mv, 1 meg input z and built-in filtering gives great performance. Runs on 9V battery, all CMOS.

PS-2 kit **$29.95**
PS-2 wired **$39.95**

600 MHz PRESCALER

Extend the range of your counter to 600 MHz. Works with all counters. Less than 150 mv sensitivity. specify -10 or -100

Wired, tested, PS-1B **$59.95**
Kit, PS-1B **$44.95**

30 Watt 2 mtr PWR AMP

Simple Class C power amp features 8 times power gain. 1 W in for 8 out, 2 W in for 15 out, 4W in for 30 out. Max output of 35 W, incredible value, complete with all parts, less case and T-R relay.

PA-1, 30 W pwr amp kit **$22.95**
TR-1, RF sensed T-R relay kit **6.95**

MRF-238 transistor as used in PA-1 8-10db gain 150 mhz **$11.95**

Power Supply Kit

Complete triple regulated power supply provides variable 6 to 18 volts at 200 ma and +5 at 1 Amp. Excellent load regulation, good filtering and small size. Less transformers, requires 6.3 V @ 1 A and 24 VCT.

Complete kit, PS-3LT **$6.95**

RF actuated relay senses RF (1W) and closes DPDT relay. For RF sensed T-R relay TR-1 Kit **$6.95**

OP-AMP Special

BI-FET LF 13741 - Direct pin for pin 741 compatible, but 500,000 MEG input z, super low 50 p[illegible] **SOLD OUT** power drain.

50 for only $9.00 **10 for $2.00**

Regulators

78MG	$1.25	7812	$1.00
79MG	$1.25	7815	$1.00
723	$.50	7905	$1.25
309K	$1.15	7912	$1.25
7805	$1.00	7915	$1.25

Shrink Tubing Nubs

Nice precut pces of shrink size 1" x ½" shrink to ⅛". Great for splices. **50/$1.00**

Mini TO-92 Heat Sinks

Thermalloy Brand **5 for $1.00**
To-220 Heat Sinks **3 for $1.00**

Opto Isolators - 4N28 type **$.50 ea.**
Opto Reflectors - Photo diode + LED **$1.00 ea.**

Molex Pins

Molex already precut in length of 7. Perfect for 14 pin sockets. **20 strips for $1.00**

CDS Photocells

Resistance varies with light, 250 ohms to over 3 meg **3 for $1.00**

See List of Advertisers on page 114

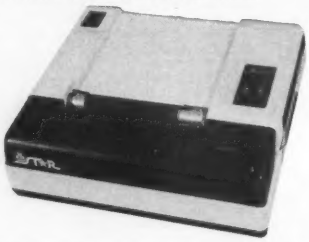
FACIT 4555 SERIAL PAGE PRINTER

The Facit 4555 alphanumerical serial printer is complete. Equipped with RS232C Interface, printing mechanism, control electronics, drive electronics, power supply and character generator. The adaptation electronics can be modified in four versions:Bit-parallel data transfer, CCITT (EIA, RS232C) for bit-serial data transfer and the current loop (TTY) interface also for bit serial data transfer. The Facit 4555 prints on ordinary paper and is adjustable for different paper widths and formats, 9.5" paper width with 66 lines per page or DIN A4 with 70 lines per page.

SPECIFICATIONS

Print speed	up to 60ch.s.	Char. spacing	2.54mm/1/10" 80ch/line 1.55mm/0.06" 132ch/line
Printing mode	Incremental.		
Max. # of ch/line	80 alt. 132.	Char. Code	ECMA-6 7-bit coded char. set
Matrix	7 X 5 dot matrix.	Char. Set	63 Char. various national versions.
Char. Size Height	2.7mm/1/8"		
Char. Size Width	1.3mm/0.05" 132ch/line 2.1mm/0.083" 80ch/line	Feed mechanism	Sprocket feed.

THESE UNITS WERE PULLED OUT OF SERVICE IN GOOD WORKING CONDITION. WE CHECK EACH UNIT ON A RADIO SHACK TRS-80 COLOR COMPUTER.

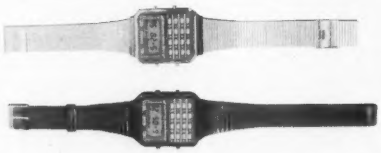


PRINTER ONLY $129.99

Printer with linecord, box of paper, inter-connect cable for TRS-80 COLOR COMPUTER. $149.99

GENEVA CALCULATOR WATCH

This attractive watch has the following modes:
Normal Time Setting,
Calendar Setting,
Daily Alarm Time Setting,
Weekly Alarm Time Setting,
Chronograph,
Calculator.



Featured in Black Plastic $24.99 or Featured in Stainless Steel $29.99

SILICON DIODES

MR751	100vdc	6Amps	10/$5.00	100/$38.00
MR510	1000vdc	3Amps	10/$3.75	100/$24.00
HEP170	1000vdc	2Amps	20/$2.00	100/$15.00
1N3209	100vdc	15Amps	$2.00	10/ $15.00
BYX21/200	200vdc	25Amps	$2.00	10/ $15.00
1N2138A	600vdc	60Amps	$5.00	10/ $40.00
DS85-04C	400vdc	80Amps	$10.00	10/ $80.00
1N3269	600vdc	160Amps	$15.00	10/$120.00
275Z41	300vdc	250Amps	$20.00	10/$175.00
7-5754	300vdc	400Amps	$30.00	10/$250.00
RCD-15	15KVDC	20ma.	$3.00	10/ $20.00
SMFR20K	20KVDC	20ma.	$4.00	10/ $30.00
1N4148	signal		30/$1.00	100/ $3.00

FAIRCHILD 4116 16K DYNAMIC RAMS 200ns. Part # 16K75

25 For $25.00 or 100 For $90.00 or 1000 For $750.00

FEED THRU SOLDER RF CAPACTORS

470pf +-20%

5/$1.00 or 100/$15.00 or 1000/$100.00

1000pf/.001uf +-10%

4/$1.00 or 100/$20.00 or 1000/$150.00

E PROMS

2708 1024x1	$2.00 each
2716 2048x8	$4.00 each
27L32/25L32	$10.00 each

HEWLETT PACKARD MICROWAVE DIODES

1N5711	(5082-2800)	Schottky Barrier Diodes	$1.00 or 10 for $ 8.50
1N5712	(5082-2810)	" " "	$1.50 or 10 for $10.00
1N6263	(HSCH-1001)	" " "	$ .75 or 10 for $ 5.00
5082-2835		" " "	$1.50 or 10 for $10.00
5082-2805	Quad Matched	" " "	per set $5.00 or 10 for $40.00

Toll Free Number
800-528-0180
(For orders only)

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MHz electronics

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

"MIXERS"

WATKINS JOHNSON WJ-M6 Double Balanced Mixer

LO and RF 0.2 to 300MHz	IF DC to 300MHz	$21.00
Conversion Loss (SSB)	6.5dB Max. 1 to 50MHz 8.5dB Max. .2 to 300MHz	WITH DATA SHEET
Noise Figure (SSB)	same as above 8.5dB Max. 50 to 300MHz	
Conversion Compression	.3dB Typ.	

NEC (NIPPON ELECTRIC CO. LTD. NE57835/2SC2150 Microwave Transistor

NF Min F=2GHz	dB 2.4 Typ.	MAG F=2GHz	dB 12 Typ.	$5.30
F=3GHz	dB 3.4 Typ.	F=3GHz	dB 9 Typ.	
F=4GHz	dB 4.3 Typ.	F=4GHz	dB 6.5 Typ.	

Ft Gain Bandwidth Product at Vce=8v, Ic=10ma. GHz 4 Min. 6 Typ.
Vcbo 25v Vceo 11v Vebo 3v Ic 50ma. Pt. 250mw

UNELCO RF Power and Linear Amplifier Capacitors

These are the famous capacitors used by all the RF Power and Linear Amplifier manufacturers, and described in the RF Data Book.

5pf	10pf	18pf	30pf	43pf	100pf	200pf	1 to 10pcs. $1.00 ea
5.1pf	12pf	22pf	32pf	51pf	110pf	220pf	11 to 50pcs. $ .90 ea
6.8pf	13pf	25pf	33pf	60pf	120pf	470pf	51 up pcs. $ .80 ea
7pf	14pf	27pf	34pf	80pf	130pf	500pf	
8.2pf	15pf	27.5pf	40pf	82pf	140pf	1000pf	

NIPPON ELECTRIC COMPANY TUNNEL DIODES $7.50

		MODEL 1S2199	1S2200
Peak Pt. Current ma.	Ip	9min. 10Typ. 11max.	9min. 10Typ. 11max.
Valley Pt. Current ma.	Iv	1.2Typ. 1.5max.	1.2Typ. 1.5max.
Peak Pt. Voltage mv.	Vp	95Typ. 120max.	75Typ. 90max.
Projected Peak Pt. Voltage mv.	Vpp Vf=Ip	480min. 550Typ. 630max.	440min. 520Typ. 600max.
Series Res. Ohms	rS	2.5Typ. 4max.	2Typ. 3max.
Terminal Cap. pf.	Ct	1.7Typ. 2max.	5Typ. 8max.
Valley Pt. Voltage mv.	VV	370Typ.	350Typ.

FAIRCHILD / DUMONT Oscilloscope Probes Model 4290B

Input Impedance 10 meg., Input Capacity 6.5 to 12pf., Division Ratio (Volts/Div Factor) 10:1, Cable Length 4Ft. , Frequency Range Over 100MHz.
These Probes will work on all Tektronix, Hewlett Packard, and other Oscilloscopes.

PRICE $45.00

MOTOROLA RF DATA BOOK

Listsall Motorola RF Transistors / RF Power Amplifiers, Varactor Diodes and much much more.

PRICE $7.50

Toll Free Number
800-528-0180
(For orders only)

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

MHz electronics

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

RF TRANSISTORS, MICROWAVE DIODES

PART	PRICE
1S2199	$ 7.50
1S2200	7.50
2N1561	25.00
2N1562	25.00
2N2857	1.55
2N2857JAN	2.55
2N2876	11.00
2N2947	18.35
2N2948	15.50
2N2949	3.90
2N2950	4.60
2N3375	8.00
2N3553	1.57
2N3632	13.80
2N3818	5.00
2N3866	1.30
2N3924	3.35
2N3927	17.75
2N3950	25.00
2N4072	1.80
2N4127	21.00
2N4427	1.30
2N4428	1.85
2N4957	3.45
2N4958	2.90
2N4959	2.30
2N5090	13.90
2N5108	4.00
2N5109	1.70
2N5160	3.45
2N5177	21.62
2N5179	1.00
2N5583	4.00
2N5589	8.65
2N5590	10.35
2N5591	13.80
2N5635	10.95
2N5637	15.50
2N5641	9.20
2N5642	10.95
2N5643	15.50
2N5645	13.80
2N5646	20.70
2N5691	18.00
2N5764	27.00
2N5836	5.45
2N5842	8.00
2N5849	20.00
2N5913	3.25
2N5922	10.00
2N5923	25.00
2N5941	23.00
2N5942	40.00
2N5944	9.20
2N5945	11.50
2N5946	19.00
2N6080	9.20
2N6081	10.35
2N6082	11.50

PART	PRICE
2N6083	$ 13.25
2N6084	15.00
2N6094 /M9622	11.00
2N6095 /M9623	12.00
2N6096 /M9624	15.50
2N6097	17.25
2N6136	21.85
2N6166	40.25
2N6201	50.00
2N6459	18.00
2N6603	12.00
2N6680	80.00
2SC756A	7.50
2SC781	2.80
2SC1018	1.00
2SC1042	12.00
2SC1070	2.50
2SC1239	2.50
2SC1251	12.00
2SC1306	2.90
2SC1307	5.50
2SC1760	1.50
2SC1970	2.50
2SC2166	5.50
8B1087 (M.A.)	25.00
A50-12	20.00
A283B	5.00
ALD4200N (AVANTEK)	395.00
AM123	97.35
AM688	100.00
BB105B	.52
BD4/4JFBD4 (G.E.)	10.00
BFQ85	1.50
BFR90	1.30
BFR91	1.65
BFW92	1.50
BFX89	1.00
BFY90	1.00
BGY54	25.00
BGY55	25.00
BGY74	25.00
BGY75	25.00
BL161	10.00
BLX67	11.00
BLY568CF	25.00
BLY87	13.00
BLY88	14.00
BLY89	15.00
BLY90	20.00
BLY351	10.00
C4005	20.00
CA402 (TRW)	25.00
CA405 (TRW)	25.00
CA612B (TRW)	25.00
CA2100 (TRW)	25.00
CA2113 (TRW)	25.00
CA2200 (TRW)	25.00
CA2213 (TRW)	25.00
CA2418 (TRW)	25.00

PART	PRICE
CA2612 (TRW)	$ 25.00
CA2674 (TRW)	25.00
CA2881-1(TRW)	25.00
CA4101 (TRW)	25.00
CA4201 (TRW)	25.00
CA4600 (TRW)	25.00
CD1889	20.00
CD2545	20.00
CMD514AB	20.00
D4959	10.00
D4987M	20.00
D5147D	10.00
D5506	10.00
D5827AM	20.00
DMD6022	30.00
DMS-2A-250	40.00
HEP76	4.95
HEPS3002	11.30
HEPS3003	30.00
HEPS3005	10.00
HEPS3006	19.90
HEPS3007	25.00
HEPS3010	11.34
HTEF2204 H.P.	112.00
5082-0112 H.P.	14.20
5082-0253 H.P.	105.00
5082-0320 H.P.	58.00
5082-0386 H.P.	POR
5082-0401 H.P.	POR
5082-0438 H.P.	POR
5082-1028 H.P.	POR
5082-2711 H.P.	23.15
5082-3080 H.P.	2.00
5082-3188 H.P.	1.00
5082-6459 H.P.	POR
5082-8323 H.P.	POR
35826E H.P.	POR
35831E H.P.	29.99
35853E H.P.	71.50
35854E H.P.	75.00
HPA0241 H.P.	75.60
HXTR3101 H.P.	7.00
HXTR3102 H.P.	8.75
HXTR6101/2N6617 H.P.	55.00
HXTR6104 H.P.	68.00
HXTR6105 H.P.	31.00
HXTR6106 H.P.	33.00
QSCH1995 H.P.	POR
JO2000 TRW	10.00
JO2001 TRW	25.00
JO4045 TRW	25.00
K3A	10.00
MA450A	10.00
MA41487	POR
MA41765	POR
MA43589	POR
MA43636	POR
MA47044	POR
MA47651	25.50

Toll Free Number
800-528-0180
(For orders only)

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MHz electronics

GaAs, TUNNEL DIODES, ETC.

PART	PRICE
MA47100	$ 3.05
MA47202	30.80
MA47771	POR
MA47852	POR
MA49558	POR
MB4021	POR
MBD101	1.00
MDO513	POR
MHW1171	42.50
MHW1182	48.60
MHW4171	49.35
MHW4172	51.90
MHW4342	68.75
MLP102	25.00
MM1500	32.32
MM1550	POR
MM1552	50.00
MM1553	50.00
MM1614	10.00
MM2608	5.00
MM3375A	11.50
MM4429	10.00
MM8000	1.15
MM8006	2.30
MO277L	POR
MO283L	POR
MO3757	POR
MP102	POR
MPN3202	10.00
MPN3401	.52
MPN3412	1.00
MPSU31	1.01
MRA2023-1.5 TRW	42.50
MRF212/208	16.10
MRF223	13.25
MRF224	15.50
MRF237	3.15
MRF238	12.65
MRF243	25.00
MRF245	34.50
MRF247	34.50
MRF304	43.45
MRF315	23.00
MRF420	20.00
MRF421	36.80
MRF422	41.40
MRF427	16.10
MRF428	46.00
MRF450/A	13.80
MRF453/A	17.25
MRF454/A	19.90
MRF455/A	16.00
MRF458	19.90
MRF463	25.00
MRF472	1.00
MRF475	2.90
MRF477	11.50
MRF502	1.04

PART	PRICE
MRF503	$ 6.00
MRF504	7.00
MRF509	5.00
MRF511	8.65
MRF605	20.00
MRF629	3.47
MRF644	23.00
MRF816	15.00
MRF823	20.00
MRF901	3.00
MRF8004	2.10
MS261F	POR
MT4150 Fair.	POR
MT5126 Fair.	POR
MT5481 Fair.	POR
MT5482 Fair.	POR
MT5483 Fair.	POR
MT5596 Fair.	POR
MT5764 Fair.	POR
MT8762 Fair.	POR
MV109	.77
MV1401	8.75
MV1624	1.42
MV1805	15.00
MV1808	10.00
MV1817B	10.00
MV1863B	10.00
MV1864A	10.00
MV1864B	10.00
MV1864D	10.00
MV1868D	10.00
MV2101	.90
MV2111	.90
MV2115	1.55
MV2201	.53
MV2203	.53
MV2209	2.00
MV2215	2.00
MWA110	7.45
MWA120	7.80
MWA130	8.25
MWA210	7.80
MWA220	8.25
MWA230	8.65
MWA310	8.25
MWA320	8.65
MWA330	9.50
NEC57835	5.30
ON382	5.00
PPT515-20-3	POR
PRT8637	POR
PSCQ2-160	POR
PT3190	POR
PT3194	POR
PT3195	POR
PT3537	POR
PT4166E	POR
PT4176D	POR

PART	PRICE
PT4186B	$ POR
PT4209	POR
PT4209C	POR
PT4566	POR
PT4570	POR
PT4571	POR
PT4571A	POR
PT4577	POR
PT4590	POR
PT4612	POR
PT4628	POR
PT4640	POR
PT4642	POR
PT5632	POR
PT5749	POR
PT6612	POR
PT6626	POR
PT6709	POR
PT6720	POR
PT8510	POR
PT8524	POR
PT8609	POR
PT8633	POR
PT8639	POR
PT8659	POR
PT8679	POR
PT8708	POR
PT8709	POR
PT8727	POR
PT8731	POR
PT8742	POR
PT8787	POR
PT9790	41.70
PT31962	POR
PT31963	POR
PT31983	POR
PTX6680	POR
RAY-3	24.99
40081	POR
40281	POR
40282	POR
40290	POR
RF110	25.00
SCA3522	POR
SCA3523	POR
SD1065	POR
SS43	POR
TP1014	POR
TP1028	POR
TRW-3	POR
UTO504 Avantek	70.00
UTO511 Avantek	75.00
V15	4.00
V33B	4.00
V100B	4.00
VAB801EC	25.00
VAB804EC	25.00
VAS21AN20	25.00

Toll Free Number
800-528-0180
(For orders only)

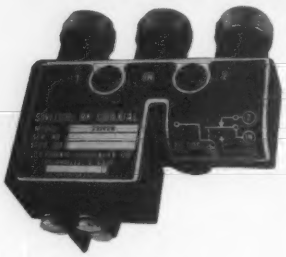
"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

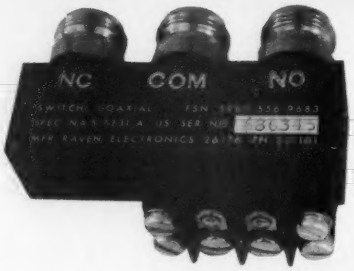
MHz electronics

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

COAXIAL RELAY SWITCHES SPDT

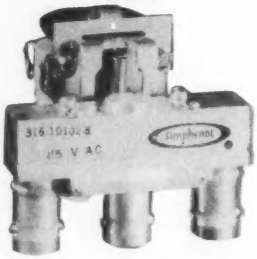
Electronic Specialty Co./Raven Electronics FSN 5985-556-9683 $49.00
Part # 25N28 Part # SU-01
26Vdc Type N Connector, DC to 1 GHz.





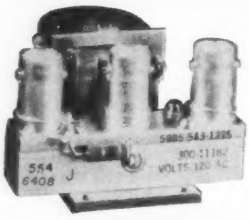
Amphenol
Part # 316-10102-8
115Vac Type BNC DC to 3 GHz.

$29.99



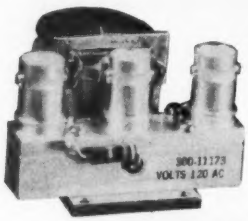
FXR
Part # 300-11182
120Vac Type BNC DC to 4 GHz.
FSN 5985-543-1225

$39.99



FXR
Part # 300-11173
120Vac Type BNC Same
FSN 5985-543-1850

$39.99



BNC To Banana Plug Coax Cable RG-58 36 inch or BNC to N Coax Cable RG-58 36 inch.

$7.99 or 2 For $13.99 or 10 For $50.00 $8.99 or 2 For $15.99 or 10 For $60.00

SOLID STATE RELAYS

P&B Model ECT1DB72 PRICE EACH $5.00	5vdc turn on	120vac contact at 7amps or 20amps on a 10"x 10"x .124 aluminum. Heatsink with silicon grease.
Digisig, Inc. Model ECS-215 PRICE EACH $7.50	5vdc turn on	240vac contact at 14amps or 40amps on a 10"x 10"x .124 aluminum. Heatsink with silicon grease.
Grigsby/Barton Model GB7400 PRICE EACH $7.50	5vdc turn on	240vac contact at 15amps or 40amps on a 10"x 10"x .124 aluminum. Heatsink with silicon grease.

NOTE: *** Items may be substituted with other brands or equivalent model numbers. ***

MHz electronics

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

Toll Free Number
800-528-0180
(For orders only)

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

RECALL PHONE MEMORY TELEPHONE WITH 24 NUMBER AUTO DIALER

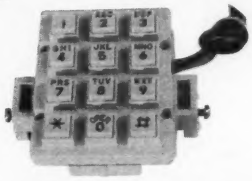
The Recall Phone Telephone employs the latest state of art communications technology.It is a combination telephone and automatic dialer that uses premium-quality,solid-state circuitry to assure high-reliability performance in personal or business applications. $49.99

ARON ALPHA RAPID BONDING GLUE

Super Glue #CE-486 high strength rapid bonding adhesive.Alpha Cyanoacrylate.Set-Time 20 to 40 sec.,0.7fl.oz.(20gm.)
$2.00

TOUCH TONE PAD

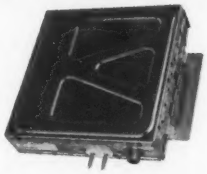
This pad contains all the electronics to produce standard touch-tone tones. New with data.



$9.99 or 10/$89.99

MITSUMI UHF/VHF VARACTOR TUNER MODEL UVE1A

Perfect for those unscrambler projects. New with data.



$19.99 or 10/$149.99

INTEGRATED CIRCUIT.		1 to 10	11up
MC1372P	Color TV Video Modulator Circuit.	$ 4.42	$2.95
MC1358P	IF Amp.,Limiter,FM Detector,Audio Driver,Electronic Attenuator.	5.00	4.00
MC1350P	IF Amplifier	1.50	1.25
MC1330A1P	Low Level Video Detector	1.50	1.15
MC1310P	FM Stereo Demodulator	4.29	3.30
MC1496P	Balanced Modulator/Demodulator	1.50	1.25
LM565N	Phase Locked Loop	2.50	2.00
LM380N14	2Watt Audio Power Amplifier	1.56	1.25
LM1889N	TV Video Modulator	5.00	4.00
NE564N	Phase Locked Loop	10.00	8.00
NE561N	Phase Locked Loop	10.00	8.00

FERRANTI ELECTRONICS AM RADIO RECEIVER MODEL ZN414 INTEGRATED CIRCUIT.
Features:
1.2 to 1.6 volt operating range.,Less than 0.5ma current consumption. 150KHz to 3MHz Frequency range.,Easy to assemble,no alignment necessary. Effective and variable AGC action., Will drive an earphone direct. Excellent audio quality.,Typical power gain of 72dB.,TO-18 package. With data. $2.99 or 10 For $24.99

NI CAD RECHARGEABLE BATTERIES

AA Battery Pack of 6 These are Factory New. $5.00

SUB C Pack of 10 2.5Amp/Hr. $10.00

Gates Rechargeable Battery Packs

12vdc at 2.5Amp/Hr. $11.99
12vdc at 5Amp/Hr. $15.99

We will be closed April 27th through May 2nd...

See you at the Dayton Hamvention!

MHz electronics

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

Toll Free Number
800-528-0180
(For orders only)
PRICES SUBJECT TO CHANGE WITHOUT NOTICE

"SOCKETS AND CHIMNEYS"

EIMAC TUBE SOCKETS AND CHIMNEYS

SK110	Socket	$POR
SK300A	Socket For 4CX5000A,R,J, 4CX10,000D, 4CX15,000A,J	$520.00
SK400	Socket For 4-125A,250A,400A,400C,4PR125A,400A,4-500A,5-500A	260.00
SK406	Chimney For 4-250A,400A,400C,4PR400A	74.00
SK416	Chimney For 3-400Z	36.00
SK500	Socket For 4-1000A/4PR1000A/B	390.00
SK600	Socket For 4CX250B,BC,FG,R,4CX350A,F,FJ	51.00
SK602	Socket For 4CX250B,BC,FG,R,4CX350A,F,FJ	73.00
SK606	Chimney For 4CX250B,BC,FG,R,4CX350A,F,FJ	11.00
SK607	Socket For 4CX600J,JA	60.00
SK610	Socket For 4CX600J,JA	60.00
SK620	Socket For 4CX600J,JA	66.00
SK626	Chimney For 4CX600J,JA	10.00
SK630	Socket For 4CX600J,JA	66.00
SK636B	Chimney For 4CX600J,JA	34.00
SK640	Socket For 4CX600J,JA	36.00
SK646	Chimney For 4CX600J,JA	71.00
SK700	Socket For 4CX300A,Y,4CX125C,F	225.00
SK711A	Socket For 4CX300A,Y,4CX125C,F	225.00
SK740	Socket For 4CX300A,Y,4CX125C,F	86.00
SK770	Socket For 4CX300A,Y,4CX125C,F	86.00
SK800A	Socket For 4CX1000A,4CX1500B	225.00
SK806	Chimney For 4CX1000A,4CX1500B	40.00
SK810	Socket For 4CX1000A,4CX1500B	225.00
SK900	Socket For 4X500A	300.00
SK906	Chimney For 4X500A	57.00
SK1420	Socket For 5CX3000A	650.00
SK1490	Socket For 4CV8000A	585.00

JOHNSON TUBE SOCKETS AND CHIMNEYS

124-111/SK606	Chimney For 4CX250B,BC,FG,R, 4CX350A,F,FJ	$ 10.00
122-0275-001	Socket For 3-500Z, 4-125A, 250A, 400A, 4-500A, 5-500A	(pair)15.00
124-0113-00	Capacitor Ring	15.00
124-116/SK630A	Socket For 4CX250B,BC,FG,R, /4CX350A,F,FJ	55.00
124-115-2/SK620A	Socket For 4CX250B,BC,FG,R, /4CX350A,F,FJ	55.00
	813 Tube Socket	20.00

TUBE CAPS (Plate)

HR1, 4	$11.00
HR2,3, 6 & 7	13.00
HR5, 8	14.00
HR9	17.00
HR10	20.00

CHIP CAPACITORS

.8pf	10pf	100pf*	430pf
1pf	12pf	110pf	470pf
1.1pf	15pf	120pf	510pf
1.4pf	18pf	130pf	560pf
1.5pf	20pf	150pf	620pf
1.8pf	22pf	160pf	680pf
2.2pf	24pf	180pf	820pf
2.7pf	27pf	200pf	1000pf/.001uf*
3.3pf	33pf	220pf*	1800pf/.0018uf
3.6pf	39pf	240pf	2700pf/.0027uf
3.9pf	47pf	270pf	10,000pf/.01uf
4.7pf	51pf	300pf	12,000pf/.012uf
5.6pf	56pf	330pf	15,000pf/.015uf
6.8pf	68pf	360pf	18,000pf/.018uf
8.2pf	82pf	390pf	

PRICES: 1 to 10 - .99¢ 101 to 1000 .60¢ * IS A SPECIAL PRICE: 10 for $7.50
11 to 50 - .90¢ 1001 & UP .35¢ 100 for $65.00
51 to 100 - .80¢ 1000 for $350.00

WATKINS JOHNSON WJ-V907: Voltage Controlled Microwave Oscillator $110.00

Frequency range 3.6 to 4.2GHz, Power ouput, Min. 10dBm typical, 8dBm Guaranteed. Spurious output suppression Harmonic (nf_0), min. 20dB typical, In-Band Non-Harmonic, min. 60dB typical, Residual FM, pk to pk, Max. 5KHz, pushing factor, Max. 8KHz/V, Pulling figure (1.5:1 VSWR), Max. 60MHz, Tuning voltage range +1 to +15volts, Tuning current, Max. -0.1mA, modulation sensitivity range, Max. 120 to 30MHz/V, Input capacitance, Max. 100pf, Oscillator Bias +15 +-0.05 volts @ 55mA, Max.

Toll Free Number
800-528-0180
(For orders only)

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

MHz electronics

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

TUBES

TYPE	PRICE	TYPE	PRICE	TYPE	PRICE
2E26	$ 5.69	KT88	$ 20.00	6562/6974A	$ 50.00
2K28	100.00	DX362	50.00	6832	22.00
2X1000A	300.00	DX415	50.00	6883/8032A/8552	7.00
3B22	19.75	572B/T160L	49.00	6897	110.00
3B28/866A	7.50	592/3-200A3	144.00	6907A	75.00
3-500Z	102.00	807	7.50	6939	15.00
3-1000Z	400.00	811	10.00	7094	125.00
3CX1000A/8283	428.00	811A	15.00	7117	17.00
3CX1500A7/887	533.00	812A	35.00	7211	60.00
3X2500A3	200.00	813	50.00	7289/3CX100A5	34.00
3CX3000A7	490.00	829B	38.00	7360	11.00
4-65A/8165	45.00	832A	28.00	7377	67.00
4-125A/4D21	58.00	4624	310.00	7408	4.00
4-250A/5D22	75.00	4662	80.00	7650	250.00
4-400A/8432	90.00	4665	585.00	7695	8.00
4-400C/6775	95.00	5675/A	25.00	7843	58.00
4-1000A/8166	300.00	5721	200.00	7854	83.00
4B32	22.00	5768	85.00	7868	5.00
4E27A/5-125B	155.00	5836	100.00	7894	12.00
4CS250R	146.00	5837	100.00	8072	65.00
4X150A/7034	30.00	5861/EC55	110.00	8117A	130.00
4X150D/7035	40.00	5876A	25.00	8121	60.00
4X150G/8172	100.00	5881/6L6W	6.00	8122	100.00
4X250B	30.00	5893	45.00	8236	30.00
4CX250B/7203	45.00	5894/A	50.00	8295/PL172	506.00
4CX250F/G/8621	55.00	5894/B	60.00	8462	100.00
4CX250K/8245	100.00	5946	258.00	8505A	73.50
4CX250R/7580W	69.00	6080	10.00	8533W	92.00
4CX300A/8167	140.00	6083/AX9909	89.00	8560/A	65.00
4CX350A/8321	83.00	6098/6AK6	14.00	8560AS	90.00
4CX350F/J/8904	95.00	6115/A	110.00	8608	34.00
4X500A	282.00	6146	7.00	8637	38.00
4CX600J/8809	607.00	6146A	7.50	8643	100.00
4CW800F	625.00	6146B/8298A	8.50	8647	123.00
4CX1000A/8168	340.00	6146W	14.00	8737/5894B	60.00
4CX1500B/8660	397.00	6156	66.00	8873	260.00
4CX5000A/8170	932.00	6159	15.00	8874	260.00
4CX10000D/8171	990.00	6161	233.00	8875	260.00
4CX15000A/8281	1260.00	6291	125.00	8877	533.00
4PR60A	100.00	6293	12.00	8908	12.00
4PR60B/8252	175.00	6360	5.00	8930/651Z	71.00
4PR400A/8188	192.00	6524	53.00	8950	12.00
5CX1500A	569.00	6550	10.00		
6BK4C	6.00	6JM6	6.00	6LQ6 (Sylvania)	7.50
6DQ5	5.00	6JN6	6.00	6LU8	6.00
6FW5	6.00	6JS6B	6.00	6LX6	6.00
6GE5	6.00	6KG6/EL505	6.00	6ME6	6.00
6GJ5	6.00	6KM6	6.00	12BY7A	4.00
6HS5	6.00	6KN6	6.00	12JB6A	6.00
6JB5/6HE5	6.00	6LF6	6.00	6KD6	6.00
6JB6A	6.00	6LQ6 (GE)	6.00	6JT6A	6.00
				6KD6	6.00

NOTICE ALL PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE !!!!

"FILTERS"

COLLINS Mechanical Filter #526-9724-010 MODEL F455Z32F

455KHZ at 3.2KHz wide. May be other models but equivalent. May be used or new. $15.99

ATLAS Crystal Filters

5.595-2.7/8/LSB, 5.595-2.7/LSB
8 pole 2.7KHz wide Upper sideband. Impedence 800ohms 15pf In/800ohms 0pf out. 19.99

5.595-2.7/8/U, 5.595-2.7/USB
8 pole 2.7Khz wide Upper sideband. Impedence 800ohms 15pf In/800ohms 0pf out. 19.99

5.595-.500/4, 5.595-.500/4/CW
4 pole 500 cycles wide CW. Impedance 800ohms 15pf In/800ohms 0pf out. 19.99

9.0USB/CW
6 pole 2.7KHz wide at 6dB. Impedance 680ohms 7pf In/300ohms 8pf out. CW-1599Hz 19.99

KOKUSAI ELECTRIC CO, Mechanical Filter #MF-455-ZL/ZU-21H

455KHz at Center Frequency of 453.5KC. Carrier Frequency of 455KHz 2.36KC Bandwidth.
Upper sideband. (ZU) 19.99
Lower sideband. (ZL) 19.99

****

CRYSTAL FILTERS

NIKKO	FX-07800C	7.8MHz	$10.00
TEW	FEC-103-2	10.6935MHz	10.00
SDK	SCH-113A	11.2735MHz	10.00
TAMA	TF-31H250	CF 3179.3KHz	19.99
TYCO/CD	001019880	10.7MHz 2pole 15KHz bandwidth	5.00
MOTOROLA	4884863B01	11.7MHz 2pole 15KHz bandwidth	5.00
PTI	5350C	12MHz 2pole 15KHz bandwidth	5.00
PTI	5426C	21.4MHz 2pole 15KHz bandwidth	5.00
PTI	1479	10.7MHz 8pole bandwidth 7.5KHz at 3dB, 5KHz at 6dB	20.00
COMTECH	A10300	45MHz 2pole 15KHz bandwidth	6.00
FRC	ERXF-15700	20.6MHz 36KHz wide	10.00
FILTECH	2131	CF 7.825MHz	10.00

****

CERAMIC FILTERS

AXEL	4F449	12.6KC Bandpass Filter 3dB bandwidth 1.6KHz from 11.8-13.4KHz	10.00
CLEVITE	TO-01A	455KHz+-2KHz bandwidth 4-7% at 3dB	5.00
	TCF4-12D36A	455KHz+-1KHz bandwidth 6dB min 12KHz, 60dB max 36KHz	10.00
MURATA	BFB455B	455KHz	2.50
	BFB455L	455KHz	3.50
	CFM455E	455KHz +-5.5KHz at 3dB , +-8KHz at 6dB , +-16KHz at 50dB	6.65
	CFM455D	455KHz +-7KHz at 3dB , +-10KHz at 6dB , +-20KHz at 50dB	6.65
	CFR455E	455KHz +-5.5KHz at 3dB , +-8KHz at 6dB , +-16KHz at 60dB	8.00
	CFU455B	455KHz +-2KHz bandwidth +-15KHz at 6dB, +-30KHz at 40dB	2.90
	CFU455C	455KHz +-2KHz bandwidth +-12.5KHz at 6dB , +-24KHz at 40dB	2.90
	CFU455G	455KHz +-1KHz bandwidth +-4.5KHz at 6dB , +-10KHz at 40dB	2.90
	CFU455H	455KHz +-1KHz bandwidth +-3KHz at 6dB , +-9KHz at 40dB	2.90
	CFU455I	455KHz +-1KHz bandwidth +-2KHz at 6dB , +-6KHz at 40dB	2.90
	CFW455D	455KHz +-10KHz at 6dB , +-20KHz at 40dB	2.90
	CFW455H	455KHz +-3KHz at 6dB , +-9KHz at 40dB	2.90
	SFB455D	455KHz	2.50
	SFD455D	455KHz +-2KHz , 3dB bandwidth 4.5KHz +-1KHz	5.00
	SFE10.7MA	10.7MHz 280KHz +-50KHz at 3dB , 650KHz at 20dB	2.50
	SFE10.7MS	10,7MHz 230KHz +-50KHz at 3dB , 570KHz at 20dB	2.50
	SFG10.7MA	10.7MHz	10.00
NIPPON	LF-B4/CFU455I	455KHz +-1KHz	2.90
	LF-B6/CFU455H	455KHz +-1KHz	2.90
	LF-B8	455KHz	2.90
	LF-C18	455KHz	10.00
TOKIN	CF455A/BFU455K	455KHz +-2KHz	5.00
MATSUSHIRA	EFC-L455K	455KHz	7.00

****

SPECTRA PHYSICS INC, Model 088 HeNe LASER TUBES

POWER OUTPUT 1.6MW. BEAM DIA. .75MM BEAM DIR. 2.7MR 8KV STARTING VOLTAGE DC
68K OHM 1WATT BALLAST 1000VDC +-100VDC At 3.7MA $59.99

ROTRON MUFFIN FANS Model MARK4/MU2A1

115 VAC 14WATTS 50/60CPS IMPEDENCE PROTECTED-F 88CFM at 50CPS
105CFM at 60CPS THESE ARE NEW $ 7.99

MHz electronics

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Toll Free Number
800-528-0180
(For orders only)

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

"CHIPS"

FAIRCHILD VHF AND UHF PRESCALER CHIPS		PRICE
95H90DC	350MC Prescaler divide by 10/11	$ 8.50
95H91DC	350MC Prescaler divide by 5/6	8.50
11C90DC	650MC Prescaler divide by 10/11	15.50
11C91DC	650MC Prescaler divide by 5/6	15.50
11C06DC	UHF Prescaler 750MC D Type Flip Flop	12.30
11C05DC	1GHz Counter Divide by 4 (Regular price $75.00)	50.00
11C01FC	High Speed Dual 5/4 Input NO/NOR Gate	15.40
82S90	Presettable High Speed Decade/Binary Counter used with the 11C90/91 or the 95H90/91 Prescaler can divide by 100. (Signetics)	5.00
11C24DC	This chip is the same as a Motorola MC4024/4324 Dual TTL Voltage Control Multivibrator.	3.37
11C44DC	This chip is the same as a Motorola MC4044/4344 Phase Frequency Detector.	3.37

GENERAL ELECTRIC CO. GUNN DIODE MODEL Y-2167
Freq. Gap (GHZ) 12 to 18, Output (Min.) 100mW, Duty (%) CW, Typ. Bias (Vdc) 8.0, Type. Oper. (MAdc) 550, Max. Thres. (mAdc) 1000, Max. Bias (Vdc) 10.0. **$39.99**

VARIAN GALLIUM ARSENIDE GUNN DIODES MODEL VSX-9201S5
Freq. Coverage 8 to 12.4GHz, Output (Min.) 100mW, Bias Voltage (Max.) 14vdc, Bias current (mAdc) Operating 550 Typ. 750 Max., Threshold 850 Tup. 1000 Max. **$39.99**

VARI-L Co. Inc. MODEL SS-43 AM MODULATOR
Freq. Range 60 10 150MC, Insertion Loss 13dB Nominal, Signal Port Imp. 50ohms Nominal, Signal Port RF Power + 10dBm Max., Modulation Port BW DC to 1KHZ, Modulation Port Bias 1ma. Nominal. **$24.99**

AVANTEK CASCADABLE MODULAR AMPLIFIERS	Model UTO-504	UTO-511
Frequency Range	5 to 500 MHz	5 to 500 MHz
Gain	6dB	15dB
Noise Figure	11dB	2.3dB to 3dB
Power Output	+ 17dB	– 2dB to – 3dB
Gain Flatness	1dB	1dB
Input Power Vdc	+ 24	+ 15
mA	100	10
PRICE	$70.00	$75.00

HEWLETT PACKARD MIXERS MODELS	10514A	10514B
Frequency Range	2MHz to 500MC	2MHz to 500MC
Input/Output Frequency L & R	200KHz to 500MC	200KHz to 500MC
X	DC to 500MC	DC to 500MC
Mixer Conversion Loss (A)	7dB	7dB
(B)	9dB	9dB
Noise Performance (SSB) (A)	7dB	7dB
(B)	9dB	9dB
PRICE	$49.99	$39.99

FREQUENCY SOURCES, INC MODEL MS-74X MICROWAVE SIGNAL SOURCE
MS-74X: Mechanically Tunable Frequency Range (MHz) 10630 to 11230 (10.63 to 11.23GHz) Minimum Output Power (mW) 10, Overall Multiplier Ratio 108, Internal Crystal Oscillator Frequency Range (MHz) 98.4 to 104.0, Maximum Input Current (mA) 400.

The signal source are designed for applications where high stability and low noise are of prime concern. these sources utilize fundamental transistor oscillators with high Q coaxial cavities, followed by broadband stable step recovery diode multipliers. This design allows single screw mechanical adjustment of frequency over standard communications bands. Broadband sampling circuits are used to phase lock the oscillator to a high stability reference which may be either an internal self-contained crystal oscillator, externàl primary standard or VHF synthesizer. This unique technique allows for optimization of both FM noise and long term stability. List Price is $1158.00 (THESE ARE NEW) **Our Price—$289.**

HEWLETT PACKARD 1N5712 MICROWAVE DIODE
This diode will replace the MBD101, 1N5711, 5082-2800, 5082-2835 etc. This will work like a champ in all those Down Converter projects. **$1.50 or 10/$10.00**

MOTOROLA MHW1172R LOW DISTORTION WIDEBAND AMPLIFIER MODULE.
Frequency Range: 40 to 300 MHz., Power Gain at 50MHz 16.6min. to 17.4max., Gain Flatness ± 0.1 Typ. ± 0.2 Max. dB., DC Supply Voltage – 28vdc, RF Voltage Input + 70dBmV **PRICE $29.99**

GENERAL ELECTRIC AA NICADS
Model #41B905HD11-G1
Pack of 6 for $5.00 or 60 Cells, 10 Packs for $45.00
These may be broken down to individual cells.

ORDERING INSTRUCTIONS

DEFECTIVE MATERIAL: All claims for defective material must be made within sixty (60) days after receipt of parcel. All claims must include the defective material (for testing purposes), our invoice number, and the date of purchase. All returns must be packed properly or it will void all warranties.

DELIVERY: Orders are normally shipped within 48 hours after receipt of customer's order. If a part has to be backordered the customer is notified. Our normal shipping method is via First Class Mail or UPS depending on size and weight of the package. On test equipment it is by Air only, FOB shipping point.

FOREIGN ORDERS: All foreign orders must be prepaid with cashier's check or money order made out in U.S. Funds. We are sorry but C.O.D. is not available to foreign countries and Letters of Credit are not an acceptable form of payment either. Further information is available on request.

HOURS: Monday thru Saturday: 8:30 a.m. to 5:00 p.m.

INSURANCE: Please include 25¢ for each additional $100.00 over $100.00, United Parcel only.

ORDER FORMS: New order forms are included with each order for your convenience. Additional forms are available on request.

POSTAGE: Minimum shipping and handling in the US, Canada, and Mexico is $2.50 all other countries is $5.00. On foreign orders include 20% shipping and handling.

PREPAID ORDERS: Order must be accompanied by a check.

PRICES: Prices are subject to change without notice.

RESTOCK CHARGE: If parts are returned to MHZ Electronics due to customer error, customer will be held responsible for all extra fees, will be charged a 15% restocking fee, with the remainder in credit only. All returns must have approval.

SALES TAX: Arizona must add 5% sales tax, unless a signed Arizona resale tax card is currently on file with MHZ Electronics. All orders placed by persons outside of Arizona, but delivered to persons in Arizona are subject to the 5% sales tax.

SHORTAGE OR DAMAGE: All claims for shortages or damages must be made within 5 days after receipt of parcel. Claims must include our invoice number and the date of purchase. Customers which do not notify us within this time period will be held responsible for the entire order as we will consider the order complete.

OUR 800 NUMBER IS STRICTLY FOR ORDERS ONLY
NO INFORMATION WILL BE GIVEN. 1-800-528-0180.

TERMS: DOMESTIC: Prepaid, C.O.D. or Credit Card
FOREIGN: Prepaid only, U.S. Funds—money order or cashier's check only.

C.O.D.: Acceptable by telephone or mail. Payment from customer will be by cash, money order or cashier's check. We are sorry but we cannot accept personal checks for C.O.D.'s.

CONFIRMING ORDERS: We would prefer that confirming orders not be sent after a telephone order has been placed. If company policy necessitates a confirming order, please mark "CONFIRMING" boldly on the order. If problems or duplicate shipments occur due to an order which is not properly marked, customers will be held responsible for any charges incurred, plus a 15% restock charge on returned parts.

CREDIT CARDS: WE ACCEPT MASTERCARD VISA AND AMERICAN EXPRESS.

DATA SHEETS: When we have data sheets in stock on devices we do supply them with the order.

MHz electronics

(602) 242-3037
(602) 242-6918
2111 W. CAMELBACK ROAD
PHOENIX, ARIZONA 85015

Toll Free Number
800-528-0180
(For orders only)

↙48

"All parts may be new or surplus, and parts may be substituted with comparable parts if we are out of stock of an item."

↙See List of Advertisers on page 114

NEW LOW-NOISE PREAMPS

New low-noise microwave transistors make preamps in the 0.9 to 1.0 dB noise figure range possible without the fragility and power supply problems of gas-fet's. Units furnished wired and tuned to ham band. Can be easily retuned to nearby freq.

Models LNA( ), P30, and P432 shown

Model	Tunable Freq Range	Noise Figure	Gain	Price
LNA 28	20-40	0.9 dB	20 dB	$39.95
LNA 50	40-70	0.9 dB	20 dB	$39.95
LNA 144	120-180	1.0 dB	18 dB	$39.95
LNA 220	180-250	1.0 dB	17 dB	$39.95
LNA 432	380-470	1.0 dB	18 dB	$44.95

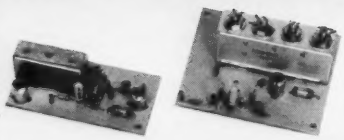
ECONOMY PREAMPS

Our traditional preamps, proven in years of service. Over 20,000 in use throughout the world. Tuneable over narrow range. Specify exact freq. band needed. Gain 16-20 dB. NF = 2 dB or less. VHF units available 27 to 300 MHz. UHF units available 300 to 650 MHz.

- P30K, VHF Kit less case $14.95
- P30C, VHF Kit with case $20.95
- P30W, VHF Wired/Tested $29.95
- P432K, UHF Kit less case $18.95
- P432C, UHF Kit with case $24.95
- P432W, UHF Wired/Tested $33.95

P432 also available in broadband version to cover 20-650 MHz without tuning. Same price as P432; add "B" to model #.

HELICAL RESONATOR PREAMPS



Our lab has developed a new line of low-noise receiver preamps with helical resonator filters built in. The combination of a low noise amplifier similar to the LNA series and the sharp selectivity of a 3 or 4 section helical resonator provides increased sensitivity while reducing intermod and cross-band interference in critical applications. See selectivity curves at right. Noise figure = 1 to 1.2 dB. Gain = 12 to 15 dB.

Model	Tuning Range	Price
HRA-144	143-150 MHz	$49.95
HRA-220	213-233 MHz	$49.95
HRA-432	420-450 MHz	$59.95

RECEIVING CONVERTERS

Models to cover every practical rf & if range to listen to SSB, FM, ATV, etc. NF = 2 dB or less.

	Antenna Input Range	Receiver Output
VHF MODELS	28-32	144-148
	50-52	28-30
Kit $44.95	50-54	144-148
Less Case $39.95	144-146	28-30
Wired $59.95	145-147	28-30
	144-144.4	27-27.4
	146-148	28-30
	144-148	50-54
	220-222	28-30
	220-224	144-148
	222-226	144-148
	220-224	50-54
	222-224	28-30
UHF MODELS	432-434	28-30
	435-437	28-30
Kit $54.95	432-436	144-148
Less Case $49.95	432-436	50-54
Wired $74.95	439.25	61.25

SCANNER CONVERTERS Copy 72-76, 135-144, 240-270, 400-420, or 806-894 MHz bands on any scanner. Wired/tested Only $79.95.

SPECIAL FREQUENCY CONVERTERS made to custom order $119.95. Call for details.

SAVE A BUNDLE ON VHF FM TRANSCEIVERS!

FM-5 PC Board Kit – **ONLY $159.95** complete with controls, heatsink, etc. 10 Watts, 5 Channels, for 6M, 2M, or 220

Cabinet Kit, complete with speaker, knobs, connectors, hardware. Only $59.95

REPEAT OF A SELLOUT!

While supply lasts, get $59.95 cabinet kit free when you buy an FM-5 Transceiver kit. Where else can you get a complete transceiver for only $159.95?

TRANSMIT CONVERTERS

For SSB, CW, ATV, FM, etc. Why pay big bucks for a multi mode rig for each band? Can be linked with receive converters for transceive. 2 watts output.

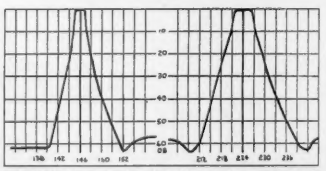
	Exciter Input Range	Antenna Output
For VHF,	28-30	144-146
Model XV2	28-29	145-146
Kit $79.95	28-30	50-52
Wired $119.95	27-27.4	144-144.4
(Specify band)	28-30	220-222
	50-54	220-224
	144-146	50-52
	50-54	144-148
	144-146	28-30
For UHF,	28-30	432-434
Model XV4	28-30	435-437
Kit $99.95	50-54	432-436
Wired $149.95	61.25	439.25
	144-148	432-436*

*Add $35 for 2M input

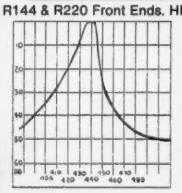
FREE OFFER

For limited time, buy a transmit converter above with 40-45W PA ($129.95) and get $39.95 cabinet FREE.

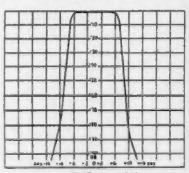
LOOK AT THESE ATTRACTIVE CURVES!



R144 & R220 Front Ends. HRA 144/220, & HRF-144/220

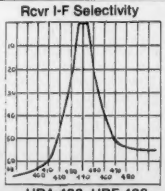


R451 Receiver Front End



Rcvr I-F Selectivity

Typical Selectivity Curves of Receivers and Helical Resonators.



HRA-432, HRF-432

- **Call or Write for FREE CATALOG** (Send $1.00 or 4 IRC'c for overseas mailing)
- Order by phone or mail ● Add $2 S & H per order (Electronic answering service evenings & weekends) Use VISA, MASTERCARD, Check, or UPS COD.

hamtronics, inc.

65-W MOUL RD. ● HILTON NY 14468

Phone: 716-392-9430

Hamtronics® is a registered trademark ↩33

AT LAST — A REPEATER YOU CAN AFFORD!

For years, Hamtronics ® Modules have been used by individual hams and manufacturers to make repeaters. Now, in the Hamtronics tradition of top quality and superb value, we are proud to offer a complete repeater package.

JUST LOOK AT THESE PRICES!

Band	Kit	Wired/Tested
6M,2M,220	$595	$745
440	$645	$795

Both kit and wired units are complete with all parts, modules, hardware, and crystals.

CALL OR WRITE FOR COMPLETE DETAILS.

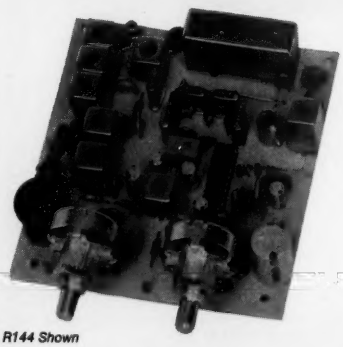
Also available for remote site linking/crossband & 10M.

FEATURES:

- SENSITIVITY SECOND TO NONE; TYPICALLY 0.15 uV ON VHF, 0.2 uV ON UHF.
- SELECTIVITY THAT CAN'T BE BEAT! BOTH 8 POLE CRYSTAL FILTER & CERAMIC FILTER FOR GREATER THAN 100 dB AT ± 12KHZ. HELICAL RESONATOR FRONT ENDS. SEE R144, R220, AND R451 SPECS IN RECEIVER AD BELOW.
- OTHER GREAT RECEIVER FEATURES: FLUTTER-PROOF SQUELCH, AFC TO COMPENSATE FOR OFF-FREQ TRANSMITTERS, SEPARATE LOCAL SPEAKER AMPLIFIER & CONTROL.
- CLEAN, EASY-TUNE TRANSMITTER; UP TO 20 WATTS OUT.

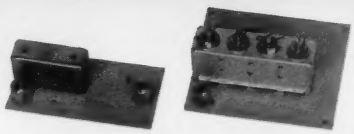
HIGH QUALITY MODULES FOR REPEATERS, LINKS, TELEMETRY, ETC.

INTRODUCING — NEW 1983 RECEIVERS



R144 Shown

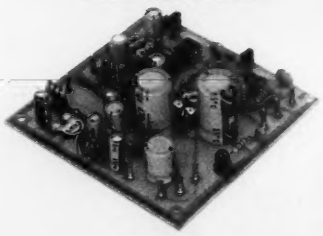
- **R144/R220 FM RCVRS** for 2M or 220 MHz. 0.15uV sens.; 8 pole xtal filter & ceramic filter in i-f, helical resonator front end for exceptional selectivity (curves at left). AFC incl., xtal oven avail. Kit only $119.95
- **R451 FM RCVR** Same but for uhf. Tuned line front end, 0.2 uV sens. Kit only $119.95.
- **R76 FM RCVR** for 10M, 6M, 2M, 220, or commercial bands. As above, but w/o AFC or hel. res. Kits only $109.95. Also avail w/4 pole filter, only $94.95/ kit.
- **R110 VHF AM RECEIVER** kit for VHF aircraft band or ham bands. Only $84.95.
- **R110 UHF AM RECEIVER** for UHF uses, including special 296 MHz model to hear SPACE SHUTTLE. Kit $94.95.



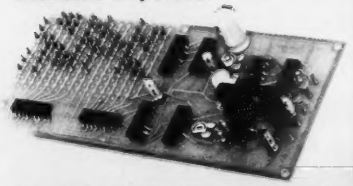
- **HELICAL RESONATOR FILTERS** available separately on pcb w/connectors.

  HRF-144 for 143-150 MHz $34.95
  HRF-220 for 213-233 MHz $34.95
  HRF-432 for 420-450 MHz $44.95

  (See selectivity curves at left.)

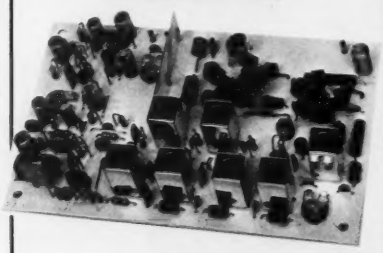


- **COR KITS** With audio mixer and speaker amplifier. Only $29.95.
- **CWID KITS** 158 bits, field programmable, clean audio. Only $59.95.



- **A16 RF TIGHT BOX** Deep drawn alum. case with tight cover and no seams. 7 x 8 x 2 inches. Only $18.00.

TRANSMITTERS AND ACCESSORIES



- **T51 VHF FM EXCITER** for 10M, 6M, 2M, 220 MHz or adjacent bands. 2 Watts continuous. Kits only $59.95

- **T451 UHF FM EXCITER** 2 to 3 Watts on 450 ham band or adjacent. Kits only $69.95.
- **VHF & UHF LINEAR AMPLIFIERS.** Use on either FM or SSB. Power levels from 10 to 45 Watts to go with exciters & xmtg converters. Kits from $69.95.

hamtronics®

SPECIALISTS · CUSHCRAFT · DRAKE · HAM KEY · HUSTLER · HY-GAIN · ICOM · KANTRONICS

LARSEN · MFJ · MORGAIN · PANASONIC · RAMSEY · SHURE · SONY · TELEX · TEN TEC · TRAC · TRANSCOM · VRN GORDON · VOCOM

ANTENNA SPECIALISTS · AVANTI · AARL PUBS · AMECO · BASH · BEARCAT · BENCHER · B&W · BIRD · CALLBOOK · COMMUNICATIONS

POPULAR VALUES FROM SPECTRONICS!

DEMO SPECIAL!

SAVE $$$-QUANTITIES LIMITED!

SONY

ICF 6800W 31-BAND PORTABLE WORLD RECEIVER

"The Best Under $1,000.00...WRTV Handbook

SUPER DEMO PRICE! **$469.95** Plus $8.00 Shipping (Cont'l USA)

List ~~$699.95~~ — Regularly ~~$549.95~~

"DEMO" SPECIAL! SAVE $80.00 MORE!

We have a limited number of factory demo ICF-6800W's, that are being offered at a saving of $80.00 over the price of new models. These units were used by SONY sales people at Trade Shows, and are still in mint condition. The full 1 year SONY warrantee is also in force. This is a super deal, and is not available from any other dealer in the U.S.A.

ORDER NOW! LIMITED QUANTITY

"easy-talk'r" VOX PORTABLE TRANSCEIVER

$49.95 ea. plus $3.00 shipping

- Up to ½ mile FM Transmitting
- "Hands free" VOX operation
- Light weight—less than 9 Oz.

Valuable aid for Amateur use in antenna installation, tuning/pruning, field day, etc., plus hundreds of applications in home business, sports and recreation. Uses 9 volt battery (not supplied.)

BEARCAT BC-100 HAND-HELD PROGRAMMABLE SCANNER

Reg. ~~$349.95~~

SALE $299.95 plus $3.00 shipping

- 8 Band, 16 Channel
- Auto Scan • Channel Lockout • "Now Take it With You Anywhere!"

REPEATING 9-MINUTE DROWSE ALARM CAN BE USED FOR STATION I.D. REMINDER

KEN-TEC* 24-HOUR DIGITAL MILITARY TIME ALARM CLOCK

$19.95 PLUS $1.50 UPS

- .7" Red LED Numerals
- 24-Hr. Memory Alarm
- 1-Year Warrantee
- Drowse Control
- Dark Brown Walnut Grain
- 2¼"H x 6¼"W x 3¼"D

SUB-AUDIBLE TONE HEADQUARTERS

ENCODERS $29.95 EACH plus $2.00 shipping (Cont'l USA only)

We stock **Communications Specialists** SS-32 and SS-32M encoders for most any mobile or hand-held applications including the very popular **Icom Handhelds**.

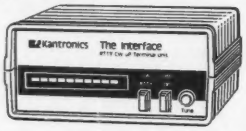
AMECO PREAMPS

add $3.00 shipping (Cont'l USA only)

Model PLF-2	$52.95
Model PLF-2E (240V)	$57.95
Model PT-2	$79.95
Model PT-2E (240V)	$84.95

Put Your Computer "On-The-Air"

The Interface™ List ~~$189.95~~ $169.95 Plus $3.00 Shipping



Your personal computer becomes a complete CW/RTTY/ASCII send and receive terminal with **The Interface** linking it to your transceiver.

If you own an Apple II or Apple II Plus, Atari 400 or 800, TRS-80 Color Computer, or VIC-20, **The Interface** will put your computer "On-The-Air".

Software for each system features split screen display, buffered keyboard, status display, and message ports. Attach any Centronics compatible printer for hard copy. Software is available, on diskette for the Apple and program boards for the others, at additional cost.

Apple diskette	Atari board	VIC-20 board	TRS-80C board
$29.95	$49.95	$49.95	$59.95

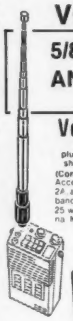
VOCOM FAVORITES

5/8 WAVE TELESCOPING ANTENNA $19.95 Plus $2.00 Shipping Cont'l USA

VoCom POWER POCKET

plus $8.00 shipping (Cont'l USA) $199.95

Accepts any version of the IC 2A, applies its output to a wide band rf amplifier, and delivers 25 watts to your mobile antenna. Mobile talk out power!

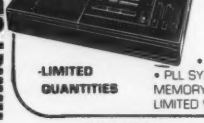


2C-025 AMP $76.50 Plus $3.00 Shipping

• 2 W In • 25 W Out

SPECIAL PURCHASE

SAVE $$$



List ~~$349.95~~ Reg. ~~$299.95~~ Now Only $259.95

SONY ICF-2001 INSTANT-ACCESS DIGITAL SHORTWAVE SCANNER

ADD $5.00 SHIPPING (CONT'L U.S.)

LIMITED QUANTITIES

- AM-CW-SSB
- 150 KHz-30 MHz + FM BROADCAST
- PLL SYNTHESIZED WITH SCANNING AND MEMORY • AC ADAPTOR • 1 YEAR FACTORY LIMITED WARRANTY

B&W PORTABLE APARTMENT ANTENNA

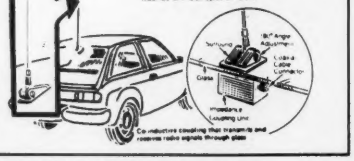
$43.75 plus $2.00 shipping

Quick, easy mounting. Tunes 2, 6, 10, 15, 20 and 40 meter Amateur bands, plus SW BC bands in some ranges. 350 watts SSB/CW. 22½ whip extends to 57. 1¼ mount. Includes 5 base loading coils. Weighs less than 2 lbs.

AVANTI THRU-GLASS ANTENNA

$32.95 plus $3.00 shipping

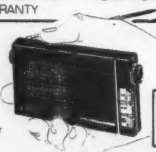
The Avanti On-Glass is the first two-way communications antenna that mounts on glass and transmits and receives through the glass. Extremely low VSWR is achieved by adjusting special tuning slug on matching network inside the vehicle. Can be easily removed for car washes without special tools.



ICR-4800

SONY 6-BAND POCKET WORLD RECEIVER

- 6-band pocket world receiver—SW 1-5, plus MW
- Extremely compact and lightweight—palm sized!
- SW band spread dial-easy tuning • Tuning indicator



$89.95 plus $3.00 shipping (Cont'l U.S.)

ALEXANDER BP 4-W 500 MAH NICAD

$24.95 plus $2.00 shipping

Fits Wilson Mark II, and Mark IV plus Yaesu FT-207. 500 MAH, 11.7 V. Nickel-Cadmium.

ICOM HEADQUARTERS

ICOM IC25A

NEW! IC3AT (220 MHz) IC4AT (440 MHz)

ICOM IC2A, IC2AT

- Compact
- Quality Construction
- Versatile
- Affordable
- Wide Range of Accessories Available

CALL FOR PRICE & AVAILABILITY

TO ORDER: CALL OR WRITE. MASTER CARD, VISA, MONEY ORDERS, PERSONAL CHECKS TAKE 3 WEEKS TO CLEAR, ACCEPTED. **INTERNATIONAL ORDERS WELCOME**, PLEASE REQUEST PRO FORMA INVOICE. ILLINOIS RESIDENTS ADD 6% SALES TAX.

HOURS: MON. THRU WED. 9:30-6:00, THURS-FRI. 9:30-8:00, SAT. 9:30-3:00

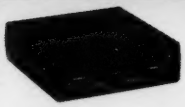
STOP BY AND VISIT WHEN IN THE CHICAGOLAND AREA!!

SPECTRONICS, INC

1009 GARFIELD ST. OAK PARK, IL. 60304

PHONE (312) 848-6777

ramsey the first name in Counters !



9 DIGITS 600 MHz $129.95 WIRED

PRICES

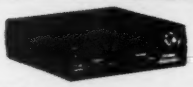
CT-90 wired, 1 year warranty	$129.95
CT-90 Kit, 90 day parts warranty	109.95
AC-1 AC adapter	3.95
BP-1 Nicad pack +AC Adapter/Charger	12.95
OV-1, Micro-power Oven time base	49.95
External time base input	14.95

The CT-90 is the most versatile, feature packed counter available for less than $300.00! Advanced design features include; three selectable gate times, nine digits, gate indicator and a unique display hold function which holds the displayed count after the input signal is removed! Also, a 10mHz TCXO time base is used which enables easy zero beat calibration checks against WWV. Optionally; an internal nicad battery pack, external time base input and Micro-power high stability crystal oven time base are available. The CT-90, performance you can count on!

SPECIFICATIONS:

Range:	20 Hz to 600 MHz
Sensitivity:	Less than 10 MV to 150 MHz Less than 50 MV to 500 MHz
Resolution:	0.1 Hz (10 MHz range) 1.0 Hz (60 MHz range) 10.0 Hz (600 MHz range)
Display:	9 digits 0.4" LED
Time base:	Standard-10.000 mHz, 1.0 ppm 20-40°C. Optional Micro-power oven-0.1 ppm 20-40°C
Power:	8-15 VAC @ 250 ma

7 DIGITS 525 MHz $99.95 WIRED



SPECIFICATIONS:

Range:	20 Hz to 525 MHz
Sensitivity:	Less than 50 MV to 150 MHz Less than 150 MV to 500 MHz
Resolution:	1.0 Hz (5 MHz range) 10.0 Hz (50 MHz range) 100.0 Hz (500 MHz range)
Display:	7 digits 0.4" LED
Time base:	1.0 ppm TCXO 20-40°C
Power:	12 VAC @ 250 ma

The CT-70 breaks the price barrier on lab quality frequency counters. Deluxe features such as; three frequency ranges - each with pre-amplification, dual selectable gate times, and gate activity indication make measurements a snap. The wide frequency range enables you to accurately measure signals from audio thru UHF with 1.0 ppm accuracy - that's .0001%! The CT-70 is the answer to all your measurement needs, in the field, lab or ham shack.

PRICES:

CT-70 wired, 1 year warranty	$99.95
CT-70 Kit, 90 day parts warranty	84.95
AC-1 AC adapter	3.95
BP-1 Nicad pack + AC adapter/charger	12.95

7 DIGITS 500 MHz $79.95 WIRED

PRICES:

MINI-100 wired, 1 year warranty	$79.95
AC-Z Ac adapter for MINI-100	3.95
BP-Z Nicad pack and AC adapter/charger	12.95

Here's a handy, general purpose counter that provides most counter functions at an unbelievable price. The MINI-100 doesn't have the full frequency range or input impedance qualities found in higher price units, but for basic RF signal measurements, it can't be beat! Accurate measurements can be made from 1 MHz all the way up to 500 MHz with excellent sensitivity throughout the range, and the two gate times let you select the resolution desired. Add the nicad pack option and the MINI-100 makes an ideal addition to your tool box for "in-the-field" frequency checks and repairs.

SPECIFICATIONS:

Range:	1 MHz to 500 MHz
Sensitivity:	Less than 25 MV
Resolution:	100 Hz (slow gate) 1.0 KHz (fast gate)
Display:	7 digits, 0.4" LED
Time base:	2.0 ppm 20-40°C
Power:	5 VDC @ 200 ma

8 DIGITS 600 MHz $159.95 WIRED

NEW READ RECEIVER FREQUENCY

SPECIFICATIONS:

Range:	20 Hz to 600 MHz
Sensitivity:	Less than 25 mv to 150 MHz Less than 150 mv to 600 MHz
Resolution:	1.0 Hz (60 MHz range) 10.0 Hz (600 MHz range)
Display:	8 digits 0.4" LED
Time base:	2.0 ppm 20-40°C
Power:	110 VAC or 12 VDC

The CT-50 is a versatile lab bench counter that will measure up to 600 MHz with 8 digit precision. And, one of its best features is the Receive Frequency Adapter, which turns the CT-50 into a digital readout for any receiver. The adapter is easily programmed for any receiver and a simple connection to the receiver's VFO is all that is required for use. Adding the receiver adapter in no way limits the operation of the CT-50, the adapter can be conveniently switched on or off. The CT-50, a counter that can work double-duty!

PRICES:

CT-50 wired, 1 year warranty	$159.95
CT-50 Kit, 90 day parts warranty	119.95
RA-1, receiver adapter kit	14.95
RA-1 wired and pre-programmed (send copy of receiver schematic)	29.95

DIGITAL MULTIMETER $99.95 WIRED

PRICES:

DM-700 wired, 1 year warranty	$99.95
DM-700 Kit, 90 day parts warranty	79.95
AC-1, AC adaptor	3.95
BP-3, Nicad pack +AC adapter/charger	19.95
MP-1, Probe kit	2.95

The DM-700 offers professional quality performance at a hobbyist price. Features include; 26 different ranges and 5 functions, all arranged in a convenient, easy to use format. Measurements are displayed on a large 3½ digit, ½ inch LED readout with automatic decimal placement, automatic polarity, overrange indication and overload protection up to 1250 volts on all ranges, making it virtually goof-proof! The DM-700 looks great, a handsome, jet black, rugged ABS case with convenient retractable tilt bail makes it an ideal addition to any shop.

SPECIFICATIONS:

DC/AC volts:	100uV to 1 KV, 5 ranges
DC/AC current:	0.1uA to 2.0 Amps, 5 ranges
Resistance:	0.1 ohms to 20 Megohms, 6 ranges
Input impedance:	10 Megohms, DC/AC volts
Accuracy:	0.1% basic DC volts
Power:	4 'C' cells

AUDIO SCALER

For high resolution audio measurements, multiplies UP in frequency.

- Great for PL tones
- Multiplies by 10 or 100
- 0.01 Hz resolution!

$29.95 Kit $39.95 Wired

ACCESSORIES

Telescopic whip antenna - BNC plug	$ 7.95
High impedance probe, light loading	15.95
Low pass probe, for audio measurements	15.95
Direct probe, general purpose usage	12.95
Tilt bail, for CT 70, 90, MINI-100	3.95
Color burst calibration unit, calibrates counter against color TV signal	14.95

COUNTER PREAMP

For measuring extremely weak signals from 10 to 1,000 MHz. Small size, powered by plug transformer-included.

- Flat 25 db gain
- BNC Connectors
- Great for sniffing RF with pick-up loop

$34.95 Kit $44.95 Wired

ramsey electronics, inc. VISA MasterCharge
2575 Baird Rd. Penfield, NY 14526 ✓ 62

PHONE ORDERS
CALL 716-586-3950

TERMS: Satisfaction guaranteed. Examine for 10 days. If not pleased return in original form for refund. Add 5% for shipping insurance to a maximum of $10. Overseas add 15%. COD add $2. Orders under $10 add $1.50. NY residents add 7% tax.

✓See List of Advertisers on page 114

DEALER DIRECTORY

Culver City CA

Jun's Electronics, 3919 Sepulveda Blvd., Culver City CA 90230, 390-8003. Trades 463-1586 San Diego. 827-5732 (Reno NV).

Fontana CA

Complete lines ICOM, DenTron, Ten-Tec, Mirage, Cubic, Lunar, over 4000 electronic products for hobbyist, technician, experimenter. Also CB radio, landmobile. **Fontana Electronics, 8628 Sierra Ave., Fontana CA 92335, 822-7710.**

New Castle DE

Factory Authorized Dealer! Yaesu, ICOM, Ten-Tec, KDK, Azden, AEA, Kantronics, Santec. Full Line of Accessories. No Sales Tax in Delaware. One mile off I-95. **Delaware Amateur Supply, 71 Meadow Road, New Castle DE 19720, 328-7725.**

San Jose CA

Bay area's newest Amateur Radio store. New & used Amateur Radio sales & service. We feature Kenwood, ICOM, Azden, Yaesu, Ten-Tec, Santec & many more. **Shaver Radio, Inc., 1378 So. Bascom Ave., San Jose CA 95128, 998-1103.**

Smyrna GA

For your Kenwood, Yaesu, ICOM, Drake and other amateur needs, come to see us. **Britt's Two-Way Radio, 2506 N. Atlanta Rd., Smyrna GA 30080. 432-8066.**

Preston ID

Ross WB7BYZ has the Largest Stock of Amateur Gear in the Intermountain West and the Best Prices. Call me for all your ham needs. **Ross Distributing, 78 So. State, Preston ID 83263, 852-0830.**

Bloomington, IL

ROHN TOWERS—Large stock plus all UNARCO ROHN items available for fast drop shipments. Wholesale prices to all users. Also wholesale distributor for **Antenna Specialists, Regency, and Hy-Gain. Hill Radio 2503 G.E. Road Box 1405, Bloomington, IL 61701 663-2141**

Terre Haute IN

Your ham headquarters located in the heart of the midwest. **Hoosier Electronics, Inc., –9 Meadows Center, P.O. Box 3300, Terre Haute IN 47803, 235-1456.**

Littleton MA

The Reliable Ham Store Serving N.E. Full line of ICOM & Kenwood. Yaesu HTs, Drake, Daiwa, B&W accessories. Curtis & Trac keyers. Larsen, Hustler, Telex/Hy-Gain products. Mirage amps., Astron P.S., Alpha Delta protectors, ARRL & Kantronics instruction aids. Whistler radar detectors. Full line of coax fittings. **TEL-COM Electronic Communications 675 Great Rd. (Rt. 119), Littleton MA 01460, 486-3400/3040.**

Ann Arbor MI

See us for products like Ten-Tec, R. L. Drake, DenTron and many more. Open Monday through Saturday, 0830 to 1730. WB8VGR, WB8UXO, WD8OKN and W8RP behind the counter. **Purchase Radio Supply, 327 E. Hoover Ave., Ann Arbor MI 48104, 668-8696.**

Somerset NJ

New Jersey's only factory-authorized ICOM and Yaesu distributor. Large inventory of new and used specials. Most major brands in stock. Complete service and facilities. **Radios Unlimited, 1760 Easton Avenue, P.O. Box 347, Somerset NJ 08873, 469-4590.**

Buffalo NY
WESTERN NEW YORK

Niagara Frontier's only full stocking Amateur dealer. Also Shortwave, CB, Scanners, Marine, Commercial. Operating displays featuring Kenwood and others. Towers, Antennas, Sales and Service. **DX Communications, 3214 Transit Road, West Seneca NY, 668-8873.**

Amsterdam NY
UPSTATE NEW YORK

Kenwood, ICOM, Drake, plus many other lines, Amateur Dealer for over 35 years. **Adirondack Radio Supply, Inc., 185 West Main Street, Amsterdam NY 12010, 842-8350.**

Syracuse-Rome-Utica NY

Featuring: Kenwood, Yaesu, ICOM, Drake, Ten-Tec, Swan, DenTron, Alpha, Robot, MFJ, Tempo, Astron, KLM, Hy-Gain, Mosley, Larsen, Cushcraft, Hustler, Mini Products. You won't be disappointed with equipment/service. **Radio World, Oneida County Airport-Terminal Building, Oriskany NY 13424, 736-0184.**

Columbus OH

The biggest and best Ham Store in the midwest featuring quality Kenwood products with working displays. We sell only the best. Authorized Kenwood Service. **Universal Amateur Radio Inc., 1280 Aida Dr., Reynoldsburg (Columbus) OH 43068, 866-4267.**

Scranton PA

ICOM, Bird, Cushcraft, Beckman, Fluke, Larsen, Hustler, Antenna Specialists, Astron, Avanti, Belden, W2AU/W2VS, CDE, AEA, Vibroplex, Ham-Key, CES, Amphenol, Sony, Fanon/Courier, B&W, Ameco, Shure. **LaRue Electronics, 1112 Grandview St., Scranton PA 18509, 343-2124.**

Mountaintop, PA
WILKES-BARRE AREA

VHF/UHF Equipment & Supplies—From HT's to KW Amplifiers, Transverters, Connectors, VHF/UHF/Microwave Linear Amplifiers, GaAs Fet Preamps, Oscar Equipment, Low Noise Preamps, Antennas, Power Supplies. From: Lunar, Microwave Modules, UHF Units/Parabolic, ARCOS, Astron, F9FT-Tonna, Tama, DenTron, KLM, Mirage, Santec, Tokyo Hy-Power, Amphenol. Two Stamps for catalog. **The VHF SHOP, Dept. S, RD 4, Box 349, Mountaintop, PA 18707, 868-6565.**

DEALERS

Your company name and message can contain up to 25 words for as little as $150 yearly (prepaid), or $15 per month (prepaid quarterly). No mention of mail-order business or area code permitted. Directory text and payment must reach us 60 days in advance of publication. For example, advertising for the June '83 issue must be in our hands by Apr. 1st. Mail to 73 Magazine, Peterborough NH 03458. ATTN: Nancy Ciampa.

DEALER DIRECTORY

PROPAGATION

J. H. Nelson
4 Plymouth Dr.
Whiting NJ 08759

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	14	14	7	7	7	7	7	7	7A	14	14	21
ARGENTINA	21	14	14	14	7A	7	14A	21	21A	21A	21A	21A
AUSTRALIA	21	14A	14	14	7B	7B	7B	14	14	14	21A	21A
CANAL ZONE	21	14A	14	7	7	7	14	21	21A	21A	21A	21A
ENGLAND	7	7	7	7	7	7A	14	21	21A	21	14A	14
HAWAII	21A	14A	14	7	7B	7B	7	7	14A	21	21A	21A
INDIA	14A	14	7B	7B	7B	7B	14	14A	21	14A	14	14
JAPAN	21	14	14	7B	7B	7B	7B	7	7	14	14	21
MEXICO	21	14	14	7	7	7	14	14A	21	21	21A	21A
PHILIPPINES	21	14	7B	7B	7B	7B	7B	7B	14	14	14	21
PUERTO RICO	14	7A	7	7	7	7	14	21	21	21A	21A	21
SOUTH AFRICA	21	14	7	7B	7A	14	21	21A	21A	21A	21A	21
U. S. S. R.	7A	7	7	7	7B	14	14	21	21	21	14	14
WEST COAST	21A	14A	14	7A	7	7	7A	14	21	21A	21A	21A

CENTRAL UNITED STATES TO:

ALASKA	14	14	7A	7	7	7	7	7	7A	14	14	21
ARGENTINA	21A	14	14	14	7A	7	14	14	21	21A	21A	21A
AUSTRALIA	21A	21	14	14	7B	7B	7B	14	14	14	21A	21A
CANAL ZONE	21	14A	14	7	7	7	14	21	21A	21A	21A	21A
ENGLAND	7	7	7	7	7	7	14	14	14A	14A	14	14
HAWAII	21A	21	14	7A	7	7	7	7	14A	21	21A	21A
INDIA	14A	14A	14	7B	7B	7B	7B	14	14	14	14	14
JAPAN	21	14	14	7B	7B	7B	7B	7	7	14	14	21
MEXICO	14A	14	7A	7	7	7	7	14	14	14A	21	21
PHILIPPINES	21	14A	14	7B	7B	7B	7B	7B	14	14	14	21
PUERTO RICO	21	14	14	14	7	7	14	21	21A	21A	21A	21A
SOUTH AFRICA	21	14	7	7B	7B	14	14A	21A	21A	21A	21A	21
U. S. S. R.	7B	7	7	7	7B	14B	14	14	21	14	14	14

WESTERN UNITED STATES TO:

ALASKA	14	14	7A	7	7	7	7	7	7A	14	14	21
ARGENTINA	21A	14A	14	14	7A	7	14	14	21	21A	21A	21A
AUSTRALIA	21A	21A	21	14A	14	14	14B	14	14	14	21A	21A
CANAL ZONE	21A	14A	14	7A	7	7	7A	14A	21A	21A	21A	21A
ENGLAND	7B	7	7	7	7	7	7B	14	14	14A	14	14
HAWAII	21A	21A	21	14	14	14	7	7	14A	21	21A	21A
INDIA	14A	14A	14	7B	7B	7B	7B	14	14	14	14	14
JAPAN	21	21	14A	14	7B	7B	7B	7	7	14	14	21
MEXICO	21A	14A	14	7	7	7	7	14	21	21	21A	21A
PHILIPPINES	21	21	14	14	7B	7B	7B	7B	14	14	14	21
PUERTO RICO	21A	14A	14	14	7A	7	14	21	21	21A	21A	21A
SOUTH AFRICA	21	14	7	7B	7B	7B	14	14	21A	21A	21	21
U. S. S. R.	7B	7B	7	7	7B	7B	7B	14B	14	14A	14	14
EAST COAST	21A	14A	14	7A	7	7	7A	14	21	21A	21A	21A

A = Next higher frequency band may also be useful.
B = Difficult circuit this period.

First letter = night waves. Second = day waves.
G = Good, F = Fair, P = Poor. * = Chance of solar flares.
 # = Chance of aurora.

NOTE THAT NIGHT WAVE LETTER NOW COMES FIRST.

APRIL

SUN	MON	TUE	WED	THU	FRI	SAT
					1 F/G	2 G/G
3 G/G	4 G/G	5 F/F	6 P/F*	7 F/G	8 F/G	9 F/F
10 F/G	11 G/G	12 G/G	13 F/F*	14 P/F*	15 P/F*	16 F/G
17 F/G	18 P/F*	19 F/G*	20 F/G	21 F/F*	22 F/F*	23 F/G
24 G/G	25 G/G	26 G/G	27 G/G	28 F/G	29 F/F	30 F/G

MEET THE NEW YAESU FT-102

The FT-102 is factory equipped for operation on all present and proposed Amateur HF bands. An extra AUX band position is available for special applications. Equipped for SSB, CW, and AM (RX), the FT-102 may be activated on FM and AM (TX) via the optional AM/FM-102 Module.

The all-new receiver front end utilizes a low-distortion RF preamplifier that may be by-passed via a front panel switch when not needed. Maximum receiver performance is yours with this impressive lineup of standard features: IF Notch Filter, Audio Peak Filter, Variable IF Bandwidth Control, IF Shift, Variable Pulse Width Noise Blanker, Independent SSB and CW Audio Channels with Optimized Audio Bandwidth, and Front Panel Audio Tone Control. Wide/Narrow filter selection is independent of the Mode switch.

The celebrated transmitter section is powered by three 6146B final tubes, for more consistent power output and very low distortion. An RF Speech Processor, Mic Amp Audio Tone Control, VOX, and an IF Monitor round out the transmitter lineup.

Futuristic panel design and careful human engineering are the hallmarks of the FT-102. Convenient pop-out controls below the meters may be retracted when not in use, thus avoiding inadvertant mistuning. Abundant relay contacts, rear panel phono jacks for PTT, microphone/patch input, and other essential interface connections make the FT-102 extremely simple to incorporate into your station.

SPECIFICATIONS

TRANSMITTER

Power Input: (1.8-25 MHz) (28-29.9 MHz)

SSB, CW	240W DC	160W DC
AM	80W DC	80W DC
FM		160W DC

RECEIVER

Image Rejection:
Better than 70dB from 1.8-21.5 MHz
Better than 50dB from 24.5-29.9 MHz

IF rejection:
Better than 70 dB

Selectivity (−6 dB/ −60 dB):
SSB, CW, AM; 2.7/4.8 kHz (with no optional filters)
Width adjusts continuously from 2.7 kHz to 500 Hz (−6 dB)

Spurious Radiation: Better than −40 dB

SP-102 FT-102 FV-102DM FC-102

SP-102

The SP-102 External Speaker/Audio Filter features a large, high-fidelity speaker with selectable low- and high-cut audio filters. The front panel A-B switch allows selection of two receiver inputs for maximum versatility. Also available is the SP-102P Speaker/Patch.

See your Authorized Yaesu Dealer today for a hands-on demonstration of the rig that everybody's talking about. It's the FT-102, The Transceiver of Champions!

Price And Specifications Subject To Change Without Notice or Obligation

1082

FV-102DM

The FV-102DM Synthesized External VFO tunes in 10 Hz steps. Keyboard entry of frequencies, UP/DOWN scanning, and 12 memories make the FV-102DM a "must" for serious DX or contest work.

FC-102

The FC-102 Antenna Coupler is capable of handling 1.2KW of transmitter power, with an in-line wattmeter, separate SWR meter, and A-B input/output selection expanding your station's capability. The optional FAS-1-4R allows remote selection of up to four antennas via one coaxial cable connected to the FC-102.

YAESU **ELECTRONICS CORP.** 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007 ⌐83
Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 • (513) 874-3100

NEW

Watts to see...

Big LCD, Big 45 W, Big 21 memories, compact.

TR-7950/7930

Outstanding features providing maximum ease of operation include a large, easy-to-read (direct sunlight or dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and band scans, built-in lithium battery memory back-up, built-in 16-key autopatch encoder, and a choice of a hefty 45 watts output (TR-7950), or 25 watts output (TR-7930).

TR-7950/TR-7930 FEATURES:

- **NEW, large, easy-to-read LCD digital display**
  Easy to read in direct sunlight or dark (back-lighted). Displays transmit/receive frequencies, memory channel, repeater offset, (+,S,−), sub-tone number (F-0, 1, 2, 3), tone, scan, and memory scan lock-out. Includes LED S/RF bar meter, and LED indicators for REVERSE, CENTER TUNING, PRIORITY, and ON AIR.
- **21 NEW, multi-function memory channels**
  Stores frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 for simplex or ± 600 kHz offset. Memory pairs 16/17, and 18/19 are paired for non-standard repeater offset. Memories "A" and "B" set upper and lower scan limits, or for simplex or ± 600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, an audible "beep" will sound.
- **Choice of 45 or 25 watts output**
  The TR-7950 provides a hefty 45 watts output, while the TR-7930 features a more modest 25 watts. A HI/LOW power switch allows power reduction to approx. 5 watts.
- **Long-life lithium battery memory back-up**
  Built-in lithium battery has an estimated 5 year life.
- **Automatic offset**
  The microprocessor is pre-programmed for simplex or ± 600 kHz offset, in accordance with the 2 meter band plan. "OS" key allows manual change in offset.
- **Programmable priority alert**
  The PRIORITY channel may be programmed in any of the 21 memories. With ALERT switch "ON," a dual "beep" sounds when a signal is present on the PRIORITY channel. An OPER switch allows an easy move to the PRIORITY channel.
- **Programmable memory scan lock-out**
  "LO" key for programming scan to skip selected memory channels, without erasing the memory.
- **Programmable band-scan width**
  The lower limit may be programmed into memory "A," and the upper limit into memory "B."
- **Center stop during band-scan, with indicator**
  Stops in center of channel during band-scan, with center tuning indicator.
- **Scan resume selectable**
  Scan stops on busy channel. Selectable automatic time resume-scan (approx. 5 sec., adjustable), or carrier operated resume-scan. A scan delay of approx. 1.5 seconds built-in.
- **Scan control using up/down microphone**
  Momentarily pressing UP or DOWN button on microphone tunes one step in the selected direction, on memory or on 5-kHz step tuning. Holding the button for about 2 seconds starts UP or DOWN automatic scan action. Scan start also possible using "SC" key on keyboard. Scan may be cancelled by momentarily pressing the PTT switch, or by pressing both UP/DOWN buttons simultaneously.
- **Programmable sub-tone channels**
  Optional TU-79 3 frequency sub-tone unit provides keyboard selectable sub-tone channels, which may be stored in memory.
- **Built-in 16-key autopatch, with monitor**
  The keyboard functions as a 16-key autopatch encoder during transmit. DTMF tones appear in the speaker output when a key is pressed during transmit.
- **Front panel keyboard control**
  Used for selecting frequency, offset, programming memories, controlling scan, and autopatch encode. Keyboard lighting is provided.
- **Extended frequency coverage**
  Covers 142.000-148.995 MHz, in 5-kHz steps.
- **Repeater reverse switch**
  Locking-type switch, with indicator.
- **"Beeper" amplified through speaker**
- **Compact, lightweight design**
- **Easy-to-install adjustable-angle mobile mounting bracket**

Optional accessories:

- TU-79 three frequency tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

More information on the TR-7950 and TR-7930 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD

...pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation